
Qatar University Research Magazine



Issue no 2 - December 2013

Feature Story

“Biofuel”

Qatar’s green
future

Dr. Al-Khalifa: RSSC seeks to become the research arm of
the National Committee for Traffic Safety

Project offers lifeline patients suffering from
acute bleeding

Drive Safe

Use 'Salamtek'

By Qatar Mobility Innovations Center (QMIC) - a Qatar University initiative



Scan the QR code and
get "Salamtek" application
for Android



Message from the VP

A new era for research is dawning at QU...



Dr. Hassan Al-Derham
Vice President for Research
Qatar University

Qatar University is looking forward to a landmark year which will open new horizons for students and researchers.

Our research activity has witnessed steady growth and we are building upon this growth by moving into a new research complex, which will provide laboratories designed to meet the highest international standards.

These developments are supported by a clear strategy which will enable Qatar University to make a real contribution to the State of Qatar, its community, and work towards fulfilling the Qatar National Vision 2030. We identified our research priorities over the course of the last academic year, which has put us in a strong position to pursue strategic initiatives.

We have supported the augmentation of research activity with the establishment of new research centers within our university colleges. The College of Arts and Sciences recently launched three centers which are considered the first of their kind in Qatar: the Center for Sustainable Development, the Center for Humanities and Social Sciences and the Center of Gulf Studies. These count among a number of specialized research centers that we have launched during the past two years, which also include the KINDI Lab for Computing Research, Qatar Road Safety Studies Center and Center of Entrepreneurship Studies.

This issue of 'Qatar University Research Magazine' features many topics that I hope you will find both interesting and informative. This quarter's feature story showcases our biofuels research project, which is an exciting example of the kind of research projects that are contributing to Qatar National Vision 2030.

We interview Dr. Khalifa Al-Khalifa, Director of Qatar Road Safety Studies Center, who discusses the prominent issues the center's researchers are investigating related to traffic safety in Qatar, and we reveal the strides made by a life-saving research project, embraced by Qatar University, into a unique treatment which could greatly increase the chances of survival for patients suffering from acute bleeding.

Moreover, this issue introduces a new section, "Student in the limelight", in which we shed light on the work and accomplishments of our first female graduate from the College of Pharmacy's Master's degree program.

Crammed full of news and features from us and our partners in the community, Qatar University Research Magazine provides a comprehensive introduction to some of the most ground-breaking research emanating from our university.

I wish you an enjoyable and enlightening read.

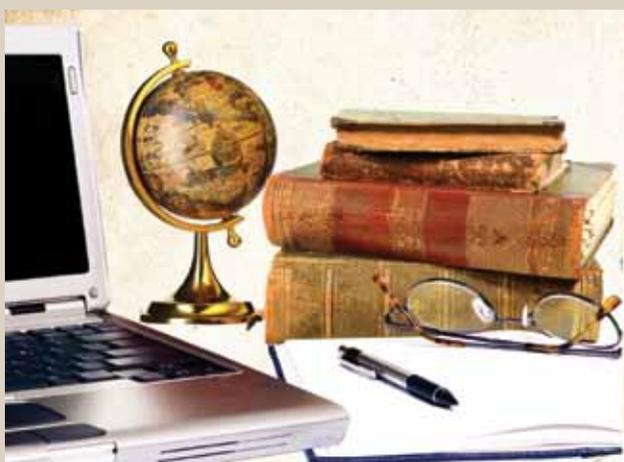


THE GULF INTELLIGENCE QATAR ENERGY R&D FORUM 2014

March 18th 2014

The New Research Complex, Qatar University

The Gulf Intelligence Qatar Energy R&D Forum is the latest addition to the GI series which has been created to advance the energy industry's contribution to Qatar's 2030 Vision of establishing a knowledge economy and a global center for research and development.



MAY 5-6 2014

Department of Humanities - College of Arts and Sciences

**Interdisciplinarity in History:
An Old Method in a New World Context**



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Qatar University Research Magazine is a publication issued by the Research office at Qatar University – Issue no 2, December 2013

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The Research office acknowledges the contributions made in support of publishing this issue, editorial contributions are also welcomed on the following email: symaa@qu.edu.qa

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Microalgae, Shutterstock, Inc.



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News

The power of three harnesses research excellence



Dr. Eiman Mustafawi
Dean of the College of Arts and Sciences

The College of Arts & Sciences (CAS) recently launched three research centers of excellence that reflect several important themes contained in the human and social development pillars of Qatar National Vision 2030 and the objectives and values outlined in the national development strategies.

The Centers for Sustainable Development, Humanities and Social Science Research, and Gulf Studies Research are the first in Qatar and were designed to harness Qatar University's (QU) role as a leader in research in the region, and to expand CAS' research capacity, capitalizing on its interdisciplinary strengths.

Their establishment is in keeping with QU's new five-year research agenda which will see interdisciplinary research projects centered on four areas of excellence: Energy, Environment and Resource Sustainability; Social Change and Identity; Population, Health and Wellness; and Information and Communication Technology (ICT).

In establishing the Center for Sustainable Development, CAS leaders have built upon the research focus of its MSc and PhD degree programs in Environmental Sciences which include water and food security, environmental preservation, and waste management; and on its dedicated Professorial Chair in Sustainable Development.

The Center for Humanities and Social Science Research will highlight four key themes – multi-disciplinarily, collaboration, research excellence, and knowledge-sharing. It will bring together research conducted in CAS' MA in Arabic Language and MA in Gulf Studies, and its planned MA in Mass Communication, focusing in particular on Qatar, the Gulf, and the Arab world. Research areas will include culture, heritage and identity; family and gender issues; social security and social justice; political identity and reform; literature; language, communication, and social media; governance, planning and social policy; migration and labor policy; and international crime.

The Center for Gulf Studies Research will undertake inter-disciplinary Gulf-focused research in three main areas – energy and economics; social issues; and politics. It will support CAS' MA program in Gulf Studies, which is currently the only such program in the world. Since its inception in 2012, the program has grown in popularity and has seen a number of high-level lectures and discussions featuring regional and international experts and observers on current and emerging issues in the Gulf and the Arab world.

The new centers will have a complementary relationship with existing QU research centers, other QU colleges and departments, and will engender synergistic collaborations with academic institutions in Qatar and beyond, national, regional and international organizations, and the wider Qatar community.

Dr. Eiman Mustafawi, Dean of the CAS, sees the centers as each providing a forum to address the research goals enshrined in the national vision and strategies; engage faculty, students, researchers and collaborators in targeted research in line with society's needs; and advance CAS branding as a college of academic and research quality and excellence.



Dr. Mohamed Ahmedna
Associate Dean for Research and Graduate Studies

Dr. Mohamed Ahmedna, Associate Dean of Research and Graduate Studies for CAS, said: "CAS has the competitive advantage in these three critical areas and it is a timely moment for us to advance our research capacity and focus to another level. These centers state our commitment to addressing new developments and changes in Qatar and the region, and finding solutions that will contribute to their progress."

The establishment of the three centers brings to six the number of research centers launched in two years at QU, which also include KINDI Lab for Computing Research, Qatar Road Safety Studies Center, and the Entrepreneurship Center.

Our Partners

Qatar University and QAPCO write the future of engineering education with new book

A Memorandum of Understanding (MoU) to publish a book on engineering education in the Middle East was signed on May 28 between Qatar University (QU) and Qatar Petrochemical Company (QAPCO). Under the terms of the agreement, Qatar University will provide the relevant academic support while QAPCO will fund the publication of the book, which will be the first of its kind in the Middle East and North Africa (MENA) region.

The agreement was signed by Qatar University's Vice President and Chief Academic Officer Dr. Mazen Hasna, and QAPCO Vice Chairman and Chief Executive Officer Dr. Mohammed Yousef Al-Mulla.

The book comprises chapters from established academics on various topics relating to engineering education in the MENA region and is edited by Dr Hasna, as well as Dr. Mahmoud Abdulwahed, Acting Director of Qatar University' College of Engineering Central Requirements Unit, and Dr. Jeff Froyd, Professor at Texas A&M University in the United States.

The chapters will include editorials and will cover such themes as innovations in learning, teaching, and engineering education; assessment and accreditation; curriculum development; and industry-university partnerships for engineering education, to name a few.

A chapter on the experience of matching industry with education will be developed by QAPCO with assistance from the book's editors.

Commenting on the MoU, Dr. Hasna said: "This book will lay the foundation for critical academic input and debate on an important topic of engineering education in general and many particular themes of high interest to Qatar and the region, namely, the contribution of engineers to a knowledge based economy, and links between



From the left Dr. Mohammed Yousef Al-Mulla, Vice Chairman & Chief Executive Officer at QAPCO and Dr. Mazen Hasna, Vice President and Chief Academic Officer at Qatar University

industry and academia. Its content will be of considerable value to faculty, researchers and industry alike as it will look at areas and themes to which many in the engineering field can relate and from which they can draw important answers and insights.

"It will also have global value for those interested in looking at the status of the engineering profession and education in the region. It is fitting that Qatar University, as the country's national university, would lead such a long-awaited publication that will advance the ongoing dialogue on engineering education and its importance for the region."

Dr. Al-Mulla praised Qatar University and the new book, saying: "Research in engineering education is new to this region, but I believe this book will not only support the study and exploration into this subject but will become a landmark

achievement for research in this field within the MENA region.

"As the first such publication in the MENA Region, I am proud that QAPCO will be associated with it and contribute to its content as it will offer academics and students an excellent insight into the advances made in engineering education within the region.

"QAPCO and Qatar University are, I believe, true pioneers in educational partnerships and can lead the way through projects such as this book and demonstrate to the world that we can play a big role in the future of engineering education and research and development."

Qatar University
Research
Magazine

Issue no 2 - December 2013

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In 1991 a ministerial decree was issued banning shrimp fishing in Qatari waters

Photo by: Environmental Studies Center, Qatar University.
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Feature Story
Biofuel

“Biofuel” Qatar’s green future



“
**Biofuel project
complies with
Qatar National
Vision 2030
to establish
a sustainable
environment**

Biofuel is an important research project that has received great interest by research centers around the world in their search for diversified, renewable and environmentally friendly energy from available natural resources. Biofuel has received as much attention at Qatar University and its project is being supported by three government agencies, namely Qatar University, Qatar Airways and Qatar Science and Technology Park. This project is being undertaken alongside other similar projects which aim to produce energy that can be used in many fields by recycling the carbon dioxide that is emitted into the atmosphere, and other industrial waste.

These projects are in line with the Qatar National Vision 2030, which aims to create a diversified and sustainable environment. The research team at Qatar University has employed native microalgae isolated from the country's different environments as a source of biofuel, which is considered a natural resource with multiple economic benefits if it is properly employed in various fields.

Qatar Biofuel Project Manager, Hareb Al-Jabri, shares with us the details of the project's objectives and promising outcomes.

**“ Al-Jabri:
“This is one of the
most important
projects being
undertaken by the
university which
will serve Qatar
significantly in
various fields in the
future.”**



Where is this project now and how do you rate it at this stage?

The first phase began in November 2010, and is scheduled to be completed by December 2013. The project is one of the most important projects undertaken by the university which will serve Qatar significantly in various fields in the future.

In fact, the first phase has already been completed and has fulfilled all its objectives. Objectives for the next stage have been identified, based on the results of the first phase, and a practical plan has been set. We are in the process of preparing a final report of the findings and a proposed plan for the next phase will be submitted to the sponsors of the project.

What are the objectives of the project?

The primary objective of the project is to produce clean and environmentally friendly alternative energy from locally available natural resources, particularly for the country's aviation sector. Qatar Airways (QA), as a leader in the field of aviation, supports these projects as part of its efforts to contribute to the environment during its trips around the globe.

QA has various other initiatives in this area which have achieved great success. For instance, QA is the first airline to use liquefied natural gas as fuel, which is more environmentally friendly than the fuel currently used in the airline industry.

As a supporter of innovative technologies, Qatar Science and Technology Park (QSTP) backs the project by providing all possible resources and manpower required for the application of these techniques. Qatar University has also embraced the idea of research in this field following a proposal for the project by one of its experts, Professor Malcolm Potts from the Department of Biological and Environmental Sciences' Faculty of Biological Sciences Program.

The project is a result of the collaboration of the three agencies whose contributions have varied with QSTP contributing 60 percent, followed by QA with 30 percent, and Qatar University with 10 percent.

Why choose microalgae as a source of biofuel?

The proposal made by Professor Malcolm Potts for using microalgae as a source of biofuels was based on scientific studies and clear evidence, taking into account that microorganisms spread

dramatically and naturally in the country's environment and surround all the country's coasts. In addition, the climatic conditions in Qatar contribute greatly to the production of biomass from these organisms.

The first phase of the project began by collecting multiple forms of single-celled photosynthetic organisms (cyanobacteria and microalgae) from different environments in the country, which were then isolated and purified through various stages of agriculture in different nutritional content. These samples recorded 200 different organisms.

The number of different types of microalgae on the shores of Qatar exceeds the sample strains that have been isolated, and Qatar has a vital diversity in microalgae; however, the 200 types were enough for the first phase and more will be isolated in future phases.

What did you learn from the first phase?

The production process of biofuels from microalgae lies in the extraction of organic chemical compounds, such as fat or carbohydrates from biomass, and then converting them into biodiesel or bioethanol, both of which can be converted later into airplane fuel.

The focus in the first phase was to isolate the different strains from the country's various environments and identify them using gene sequencing technology and then to study the appropriate conditions for the growth of each strain separately, as the speed of growth is an essential factor for the success of the project. In this phase, the proportion of biochemical matter (fat and carbohydrates) in the biomass has been studied for each isolated strain.

The purpose of these studies is to identify whether the strain has the ability to grow rapidly under natural climatic conditions and which strains have the ability to produce the highest proportion of chemical compounds.

As a result, a group of strains has been selected and has undergone a series of tests conducted under natural climatic conditions (external experiments), these strains showed high capacity to withstand the different climatic conditions in the country's environment and also produced a high rate of organic compounds.

The research team conducted a primary study into the growth of the biomass and has successfully increased the size to 50,000 liters of biomass, with density of more than 12 grams per square meter

These compounds were also used in the production of biomass bio-diesel and bio-ethanol in laboratory quantities. Recently, the research team was able to produce a third type of fuel through the conversion of the biomass into crude oil, which can be the source of other chemical compounds.

In addition to the aforementioned, another study has been conducted on the ability of some strains to recycle certain types of industrial waste into a source of nutrition, which in turn increases the rate of production of biochemical compounds in these microalgae cells.

What does the future hold for the project?

Based on the data and results from the first phase, the plan which was developed for the second phase will focus on the production system where all previously tested production-enhancing factors will be combined in a biological system that will increase the size of the biomass to a level that will make the project economically viable in the upcoming commercial stages.

Qatar University is in the process of establishing a research center for microalgae, which will include a bank of all microalgae strains that have been isolated from Qatar's environment. The center will also contain all the techniques that can be used in microalgae research, which should encourage expanding research on microalgae and will contribute to other fields such as food security and the field of medicine.

“ Qatar University is in the process of establishing a research center for microalgae, which will include a bank of all microalgae strains that have been isolated from Qatar's environment.”





Working towards a cleaner future: The Biofuel project team

“ We established a mini pilot plant at Qatar University’s research farm to study the growth of microalgae on a large scale, and under natural climatic conditions during different seasons throughout the year

What resources has the project required?

During the first phase, the infrastructure has been established for the project, which includes the launch of three high-quality laboratories equipped with advanced technologies commensurate with the project’s requirements. There was also the establishment of a mini pilot plant at Qatar University’s research farm to study the growth of microalgae on a large scale, and under natural climatic conditions during different seasons throughout the year. The team consists of 25 experienced researchers from different nationalities, 40 percent of whom are Qatari researchers who have been trained in the high levels of technology and to perform key tasks in the project.

What are the benefits of biofuels?

In addition to the economic aspects of this project, and the energy that can be produced from microalgae, there are features of great significance at an environmental level, as the project contributes to minimizing the environmental damage that results from industrial waste through the recycling of carbon dioxide and other industrial waste.

Are biofuels cost-effective?

Whether biofuels produced for aircraft by microalgae will be cheaper and more cost-effective than fuels currently used in aircrafts,

can’t be determined at this stage of the project. And the answer will not be clear until the end of the second phase. That is because the first phase focused entirely on the biological side of the project, whereas the production cost of biofuel will be examined in the next phase, in which biofuels will be produced in small scale pilot plant.

Will you collaborate with similar research centers around the world?

There are several research centers internationally which have been working in this field for more than 30 years, whereas research in Qatar for the production of biofuels began only recently. This has allowed us access to published research to learn from previous experiments and findings. We already have agreements with some international research centers and are open to collaborating with other institutions in the field.

What does this process require to be successful?

Algae, as organisms in the process of photosynthesis to produce energy, need light and carbon dioxide in good climatic conditions which provide the appropriate and necessary nutrients for their growth. The success of this project on a commercial scale in the future depends mainly upon the ability to increase the growth of these algae to an economically viable scale. To achieve this goal, a number of factors and conditions must be provided for the growth of algae which are as follows:



Hareb Al-Jabri, Manager of the Biofuel project

“ “ The availability of all the circumstances for the growth of microalgae in Qatar explains the the biodiversity of these organisms in various regions of the country

First: to select high-capacity strains with rapid growth rates to produce the largest amount of biochemical compounds under the climatic conditions of the different seasons of the year.

Second: the temperature must be suitable for the growth of these microalgae. Studies have shown in the first phase that most of the strains extracted from Qatar's environment have the ability to grow at temperatures between 25 to 45 degrees Celsius, which is significantly similar to the temperature range of Qatar's climate.

Third: providing adequate quantities of sunlight, which is a condition provided by Qatar's weather for long periods throughout all seasons of the year. Nonetheless, excessive sunlight can have negative effects and prevent growth; therefore we should find a way to monitor and control the amount of sunlight, especially during summertime.

Fourth: the availability of certain nutrients necessary for the growth of these microorganisms, such as nitrogen and phosphate. In an effort to reduce the cost of production in the commercial phase, the research team was able in the first phase to employ industrial waste or treated sewage as a source of nutrients for the growth and production processes of biochemical compounds in microalgae cells.

Fifth: the availability of carbon dioxide. The State of Qatar is a leader in the field of oil and gas, which results in an increase in the proportion of carbon dioxide emitted into the air. Advanced techniques have managed to separate carbon dioxide from the gas emitted in the air or from

natural gas production processes, which in turn makes it possible to employ carbon dioxide in the process of increasing the growth range of microalgae and contribute to reducing the damage caused by carbon dioxide to the environment through re-processing and recycling it. As such, it is possible, and we have been communicating with certain industrial companies to discuss ways in which we can cooperate during the second phase of the project.

The availability of all these circumstances and motivating factors for the growth of microalgae in Qatar explains the reasons for the biodiversity of these organisms in a wide range in various regions of the country, whether onshore or offshore.

What has been your role in the project?

I joined this project at the very beginning and have acquired in-depth expertise on a scientific and administrative level through which I have established a strong base in the management of scientific projects.

I'm going to embark upon other scientific projects which will play an important role for the State of Qatar during this upcoming year. On an academic level, I have begun preparing for a doctorate in the field of biofuels.

News

MASARAK™ Driver Anti-Distracted Initiative for Road Safety Revealed

The Qatar Mobility Innovations Center (QMIC) at the Qatar Science and Technology Park (QSTP) and the Ministry of Municipality Affairs and Planning (MMUP) launched a smart mobility initiative and applications that help improve road safety in Qatar. During an event held at QSTP, QMIC and MMUP introduced "Salamtek", an android application supporting driver anti-distraction by intelligently limiting the phone usage while driving. This is an important step to help enhance awareness about the importance of road safety for the people of Qatar and the region, and give them the solution to help make a difference.



The "Salamtek" application Settings Screen



From the left Dr. Adnan Abu-Dayya, Eng. Ibrahim Abbas, Mr. Abdulaziz Alkhal

Qatar witnesses a large number of accidents yearly, many of them fatal. The Ministry of Interior published the number of accidents in 2011 to be 3780, including 205 deaths. In 2012, there were 4218 accidents, including 204 deaths.

With the increase of vehicles, these numbers are guaranteed to increase. These are extremely radical numbers that must be decreased with the help of local R&D institutions and the participation of the rest of the population.

Many of these accidents are caused from overspeeding lane violations, driver distraction, etc. To tackle this issue, QMIC through Masarak, is concentrating on road safety by working towards achieving safe roads, safe vehicles, safe drivers and safe infrastructure.

Dr. Adnan Abu-Dayya, Executive Director of QMIC said, "As the regional and national leader in the areas of Intelligent Mobility and Road Safety, we have expanded our Masarak portfolio with rich applications and services that are optimized for customers in our region. Today is a milestone for all of us, as we have created the first Anti-Distracted mobile application made in the Arabian Gulf region. We hope that drivers in Qatar and the region join us in using this application to help prevent potential accidents. This is just the beginning for us and we plan to expand our anti-distraction portfolio of applications and services over the next few months".

Eng. Ibrahim Abbas, the Director of Transportation & Infrastructure Planning at MMUP, said: "We are very pleased that our joint Masarak solution started to deliver applications and services that directly address the important road safety segment. We have the confidence that partnerships between government entities like MMUP and innovations institutions like QMIC represent an excellent model for addressing the challenges of Qatar and the region".

"Salamtek" is a smart application (currently available for Android phones) that will limit the usage of the phone while driving so that the driver focuses on the road. The user can set the speed upon which the application will start blocking, and the time interval through which the application will operate. In addition, the user can set up to three VIP numbers and three mobile applications which he or she can access even through the blocking criteria. The application will keep a log of all calls blocked and callers will be automatically notified once blocking happens because of driving conditions.

Mr. Abdulaziz AlKhal, Director of Masarak said, "Salamtek is the beginning of what is an elaborate initiative to help support driver anti-distraction and road safety. We hope that this will put a dent in the continuously increasing numbers of deaths caused by car accidents. This is a solution that QMIC, MMUP and Masarak are proud to introduce".

Our Partners

Scientific minds meet over Arabian Sea research



ESC and NIO researchers discuss common interests

A delegation from the Environmental Studies Center at Qatar University visited the Indian National Institute of Oceanography (NIO) in the city of Goa, India from 29 October to 3 November 2013.

The delegation was formed of Professor Fadhil Sadooni, Associate Director of the center, Dr. Ebrahim Al-Ansari, Head of the Applied Research Department, Dr. Ibrahim Al-Meslamani, Head of the Internal Affairs Department and Mr. Ismail Mahmood, Head of the Technical Services Department in the center.

The delegation was received by NIO director Dr. S.W.A. Naqvi and senior research staff. They held many meetings to discuss

possible collaboration in research, services and the management of the Environmental Studies Center's research vessel, Janan.

The Indian side organized tours of different parts of the organization, enabling the delegation to examine some of the equipment used for marine surveys and which is manufactured by the NIO.

The two sides agreed to collaborate in many areas of common interest, such as conducting joint research on the water body of the Arabian Gulf and the Arabian Sea, the use of the NIO experience in modeling, dust control and mitigation, biotechnology, Environmental Impact Assessment (EIA) studies, bio organic chemistry, and

phytoremediation of sewage and industrial water, as well as in the study of microbial sediments.

NIO agreed also to help the Environmental Studies Center in sub-contracting parts of the EIA studies for some of the major companies working in Qatar and to organize jointly an international conference on the marine sciences of the Arabian Gulf and the Arabian Sea.

The relationship between the two sides will be regulated through a Memorandum of Understanding to be signed by the two institutes.

Research Issues
Part 2 of 3

Highlights from the renaissance of Muslim scholars research



Dr. Sherine El Menshawy

Associate Professor-
Ancient History-Department of
humanities – History program

We resume the discussion we have started in the first issue of Qatar University Research Magazine about “the evolution of the concept of search to research in ancient times”. In this issue we will address the development of scientific research by scholars from the Muslim nation. The word “Read” was the first word in the Holy Quran, which signifies the significant status of knowledge and scientific research in Islam.

For example, credit for all computational methods used today goes to Muslim scholars, especially to the early mathematician Abu Abdullah Muhammad bin Musa Al-Khwarizmi Alcrdobra (Figure 1), known as Al-Khwarizmi, who has been recognized for his research and contributions to the discipline of algebra which has played a significant role in the development of mathematics in his time.

His work has resulted in changing the idea of mathematics, which was founded on the Greek geometrical concept of mathematics. This in turn has allowed for the science of mathematics to be applied in ways which were not possible before and to invent new problem-solving methods. This discipline has been translated into foreign languages

(Figure 1)

Al-Khwarizmi post stamp issued by the Soviet Union in 1983

(a publication after Mustafa Mushrifah and Mohammed Mursi Ahmed, publishing Algebra book and interview, Cairo, 1986)



as ‘algebra’ which comes from the Arabic language.

Muslim scholars have developed their research in chemistry and have contributed greatly to the field through the work of some

of its scholars, like the prominent chemist Jabir bin Hayyan bin Abdallah (Figure 2), the son of a pharmacist who lived in Kufa, Iraq. His work has contributed greatly to the field as he was able to conduct chemical classifications in a scientifically safe manner. In his laboratory, he conducted chemical processes such as purification, crystallization oxidation and evaporation processes. He is



(Figure 2)

European manuscript from the fifteenth century depicting Jabir bin Hayyan (a publication after Pierre Lory, fourteen letters in chemistry for Jabir bin Hayyan, Damascus, 1988)

credited for the classification of elements into alcohol, metals and minerals.

Jabir had carried out his research in his laboratory in Kufa, which was discovered after the removal of old houses in the neighborhood two centuries after his death. A mortar was found in the laboratory, which is suspected to have been used in research investigations. Jabir’s contributions to chemistry have been recognized worldwide and his research and studies have been the main reference in Europe until the 18th century.

In the world of optics and vision science, Abu Ali Al-Hasan ibn Al-Hasan ibn Al-Haytham has applied accurate measurements in the science of visual research through his experiments using scientific methods inspired by Greek studies of light reflection and refraction.

Commenting on his research on the theory of vision, he said: “We start the search by inducting the existing objects, examine the conditions of the observers, distinguish the

properties of molecules, and then we identify what relates to sight in the vision process.

“We also distinguish what is static, that does not change, and what is physically apparent and could be identified with a simple touch. Then we gradually progress in the search and measurements, criticizing the introductions and confining the results. And we ensure that the purpose in all our research and observations is to apply justice not capriciousness, and ensure that what we distinguish and criticize is a factual quest for truth and is not swayed by opinions or prejudice. Perhaps then we can conquer our quest by achieving the gratifying truth, and gradually get to our pursuit where certainty falls, where criticism and bounds will help us achieve the truth and overcome all disputes.”

Thus, Hassan’s experimental directives rested on combining inductive reasoning and measurement, and he had developed the basis for scientific research, which is factual research apart from opinions and prejudice.

It is certain that Ibn Al-Haytham (Figure 3) has contributed greatly with publications and

scientific discoveries that have been proven by modern science.

In the field of Earth sciences, credit goes to Greek scholars for their research in this field, especially the work of Ptolemy in the second century AD. Credit also goes to studies conducted by scholars of ancient



(Figure 3)
Ibn Al-Haytham

Egypt and Iraq. However, Abu-Alrayhan Mohammed bin Ahmed Al-Biruni (Figure 4), who was regarded as one of the greatest scholars of the medieval Islamic era, was able to conduct detailed studies of Earth’s surface and introduced longitude and latitude

(Figure 4)
Abū al-Rayhān al-Bīrūnī [r
(a publication after *De scientiastellarum-De numeris stellarum et motibus*, Polonia, 1645)



measurements.

Al-Biruni was also the first scholar to argue that the Earth rotates around its axis, even though the Andalusian polymath Ibn Hazim had stated that: “... Evidence proves that Earth is spherical, yet the general public says otherwise, stating that the sun is perpendicular on a specific point on Earth.” This in turn is an example of the achievements and contributions of Muslim scholars as they base their research on scientific observations, monitoring and abstraction, disregarding common mythological stories.

In the field of Earth sciences, ancient Egyptians and Iraqis and ancient Greeks and Romans have discovered various types of minerals and precious stones and jewels; however, the work of Muslim scholars has contributed greatly. They have gathered and documented a wide range of data on minerals and plans in books like the ‘Book of Healing’, ‘Al-Shifa’, by Abu Ali Ibn Sina (Figure 5), which was published in the 11th century. The book includes sections on mineralogy and meteorology, and talks about the formation of mountains and their benefits, earthquakes and mineral formations.



(Figure 5)
An illustration of Ibn Sina writing the law of medicine book
(‘The Book of Healing to cure the ignorance of the soul, Ibn Sina, Topkapi Palace Museum, Ahmed III 3261)

This book has gained wide recognition among European scholars during the

European Renaissance because it provided a wide range of detailed data.

Contemporary historians stated that in the 11th century, Ibn Sina suggested a theory on the formation of mountains, which was introduced to the Western world 800 years later by European scientists as part of new research studies.

In the concept of pumping water, ancient Muslims developed innovative techniques to contain water and draw water through channels. Their innovations have been influenced by information passed on from ancient civilizations, like the use of a ‘sweep’ in ancient Egypt, a simple tool used to draw water.

Islamic sources have mentioned the Norias, or “wheels of pots”, for the first time in the event of digging a channel in the Basra area in the late 7th century. Muslim engineers have contributed greatly through their research and experiments to harness water and animals to increase production, including the work of Badi’Al-Zaman Ab Al-’Izz ibn Ism’ I ibn Al-Raz z Al-Jazar (Figure 6)

and Taqi Al-Din Muhammad ibn Ma’ruf, who have written multiple books on technology.

And through their research and experiments, they have discovered many important machines that were not known anywhere else in the world, as well as discovering the automatic operations of these machines which has led to tremendous developments in the history of technology.

(Figure 6)
Art portrait illustrating Al-Jazri’s features



When discussing the decipherment of ancient Egyptian inscriptions, it is common to recognize the efforts of the German Thomas Young and the French Jean-François Champollion; however, Muslim scholars have displayed commitment to study ancient Egyptian inscriptions, which have resulted in a number of disclosed research attempts. Some European Orientalists have documented the works of Muslim scholars, such as the Austrian Orientalist Joseph



Arabs research to decipher the Ancient Egyptian language before Champollion (Al-Daly, Okasha, Egyptology: The Missing Millennium, London, 2005)

Hmerfon Bergstral, who in 1806 translated and published the Arabic manuscript of Ibn Wahshiyya's book 'Kitab Shawq Al-Mustaham' which dates back to the 9th century.

The book discusses Al-Nabati's understanding of a number of ancient alphabets, in which he deciphered a number of Egyptian hieroglyphs to help determine the meaning of certain vocabularies. Egyptian historian, Al-Maqrizi is remarkable in this context for his unusually keen interest in hieroglyphic script and he was able to translate some of the ancient Egyptian manuscripts, as well as providing a scientifically accurate description similar to the rules and guidelines applied now on documented scientific research publications.

Abu Al-Qasim Khalaf ibn Al-Abbas Al-Zahrawi (Figure 7), also known as Abulcasis, was a Muslim physician who has contributed greatly to the field of surgical instruments. His greatest contribution to medicine is his 'Kitab al-Tasrif' book, an encyclopedia of more than 200 medical instruments and their applications. His book and pioneering contributions to the field had an enormous impact in the West.

In the field of sociology, Ab Zayd 'Abdu r-Ra m n bin Mu ammad Ibn Khaldun Al- a rami is regarded to be among the most important scholars in the classical Islamic era. Even though Ibn Khaldun was working in law and politics; he continued his academic research and wrote a number of historical publications such as 'Kit bu l- ib r', the 'Book of Lessons', which introduced his theory in the science of civilization.

Ibn Khaldun (Figure 8) introduced the idea that history is not just a list of facts; rather, it depends upon who explained these facts, and from which part of the world they came. He rejected preconceptions and unverified details.

He has left a legacy in the field and his contributions are still evident today.



(Figure 7) Khalaf ibn al-Abbas Al-Zahrawi A publication after the thirtieth article from Kitab al-Tasrif, Al-Riyadh, 1993

European scholars have recognized the legacy of Islamic civilization, as stated by Sejdiu that "Arabs are in fact the leaders in all branches of knowledge". Similarly, Sarton also stated that "the contributions of Islamic civilization in scientific disciplines are greater than the works of the Kingdom of Byzantium".



(Figure 8) Ibin Khaldun (Published after Scientific publication of Abdul Rahman Ibn Khaldun, Introduction, Morocco, 2005)

Liberi stated that "if the Arabs were not present on the stage of history, the European Renaissance would have been behind for several centuries" and Karadifoa has also pointed out that "the Arabs have reserved, and improved different branches of knowledge, and have kept the research spirit alive and thus they have paved the way for modern civilization".

Finally, Sigrid Hernkh indicated that "the Arabs have provided Europe with the greatest gift of all: accurate scientific research methods which have paved the way for the West to unravel the mysteries of nature, and control them in the present". We conclude by highlighting the fact that that while Europe was still in the Middle Ages, the Arab Muslim worlds were living the era of scientific research and innovation.

To be continued in the next issue...

Our Partners

Qatar University reinforces team with aluminum experts appointed as industry chairs

تعيين كرسي أستاذية من قطر للألومنيوم
هيدرو بمركز المواد المتقدمة بجامعة قطر

New Qatalum/Hydro Chair Professors at Qatar University



Industrial partners Qatalum and Hydro have announced that the two positions of Qatalum/Hydro Chair at Qatar University will be held in tandem by Professor Hans Roven and Professor Geir Martin Haarberg, both of whom are currently based out of the Norwegian University of Science and Technology (NTNU) in Trondheim, Norway. Professor Roven started his newly appointed responsibility in September 2013, and Professor Haarberg will commence from January 2014.

In a joint statement, Roven and Haarberg said: “Our main responsibilities are linked to expanding knowledge, research and innovation with aluminum alloys and processes in Qatar. We hope to help position Qatar as a core knowledge center for aluminum technology in the Middle-East.”

The professors’ sentiment was echoed by Qatalum’s Deputy CEO Khalid Larem, who added: “This Chair exemplifies Qatalum’s commitment to facilitate a knowledge based economy in line with Qatar’s Vision 2030. By playing a leading role at an educational level we hope to connect students and our culture with the attributes of aluminum and encourage them to choose our field as their career of choice.

“Qatalum maintains a strong commitment to the educational sector and is more than willing to discuss further opportunities for research and development. By bringing such expertise here, Qatalum is enabling Qatar to become an aluminum technology leader within the GCC.”

Qatalum believes there is more value to be gained in promoting aluminum as a material of choice in the construction sector, structural and transportation sectors, automotive sector and for marine applications, while furthering the industrial application and usage of aluminum will create more opportunities and jobs in Qatar and the GCC.

The Hydro Technology Center Qatar was established in 2009 with the aim of improving the safety and productiveness of the Qatalum smelter, through both technology development and training in close cooperation with Qatar University. Projects in scope include hot-climate working conditions, environmental issues, logistics and aluminum competence development in the Gulf region oriented towards downstream activities.

Professors Roven and Professor Haarberg highlight that they, in their new functions, will lead and

support the effort towards establishing research projects that will be oriented towards aluminum applications and end use. “We will try to further develop a center of a high international standard for research and education related to important aspects of the process of primary aluminum production,” they added.

Qatalum and Hydro have been very active in the process of establishing the arrangement of the New Qatalum/Hydro Chair Professors. Qatar University is one of the companies’ strategic university partners and an important recruitment base for Qatalum in the coming years. The professors’ expertise is complementary and covers Qatalum’s main operational units as well as the downstream processes for customers of Qatalum. An additional outcome of the new chairs is the possibility of close collaboration within education and research between Qatar University and the Norwegian Institute of Science and Technology (NTNU) in Trondheim.

Interview with Researcher

Researcher Profile ...

Dr. Khalifa Nasser Al-Khalifa, Ph.D. is the director and founder of Qatar Road Safety Studies Center at Qatar University. Dr. Al khalifa is the main founder of the Industrial and Systems engineering program at Qatar University which is the first of its kind in the state of Qatar.

Currently he is leading a project funded by QNRF to establish “Quality, Reliability and Maintainability Engineering Center”.

He also received around four Million dollar of different funds in the area of Quality and Reliability and road safety studies in the last 6 years . Dr. Khalifa obtained his Ph. D in Manufacturing Engineering from the University of Birmingham, UK, and his Master and Bachelor degrees respectively from Wayne State University, Michigan, USA, and University of Washington, Seattle, USA.

His research focuses on quality and reliability engineering and Road Safety. He is a member of IIE, ASQ and Qatari Society of Engineers.

Qatar University research to drive safety improvements on Qatar’s roads

Road Safety Studies Center seeks to become the research arm of the National Committee for Traffic Safety

When speaking in numbers, the language of absolute truth, the losses that result from traffic accidents, especially in human souls, raises serious concerns and requires immediate action to put traffic safety at the forefront of our endeavors.

This has resulted in the establishment of the Road Safety Studies Center, in an effort to employ scientific research to resolve community issues and challenges, and to straighten traffic behaviors and promote a culture of incitement to abide by safety rules.

Qatar University provides the center with all the facilities it requires to fulfill its mission, and to play a part in the intensive efforts being made to achieve the sustainable development of our society.

The center will engage in a series of traffic research studies which aim to produce a clear depiction of the traffic situation and provide accurate figures, answering a lot of unanswered questions in this field.

Dr. Khalifa Nasir Al-Khalifa, Director of the Road Safety Studies Center in the College of Engineering, shares with us the center’s achievements since its inauguration at the end of September 2012.



“

The Road Safety Studies Center

was established as a national center to address a universal problem that is particularly threatening our community: traffic safety.

Dr. Khalifa Nasser Al-Khalifa, Director of Road Safety Studies Center

How can research undertaken at the Road Safety Studies Center help to solve the traffic problems of Qatar?

The Road Safety Studies Center was established as a national center to address a universal problem that is particularly threatening our community: traffic safety.

It is worth mentioning that traffic accidents cause approximately 1,300,000 deaths annually around the world, which has resulted in a plan launched by the United Nations to reduce traffic accidents by 2020, thereby reducing the number of deaths. Some studies describe traffic accidents that result in human loss as murders, and they predict that the annual number of deaths will increase to 2 million worldwide by 2020. This means that, on a global level, traffic accidents result more deaths than wars, making it a pressing universal issue.

Based on that, the Road Safety Studies Center works primarily on research studies to achieve traffic safety which requires the center to cooperate with other research centers as well as several public institutions, such as the Ministry of Interior, Ministry of Public Works Ashghal, Ministry of Municipality and Urban Planning, and bus and taxi provider Karwa. These collaborations are necessary to successfully tackle traffic issues and implement safety measures, since the center specializes only in studying road safety, rather than road development.

“
Our focus now is not on intelligent systems as much as on studying traffic problems.

Are there any collaboration agreements with Qatar Mobility Innovations Center (QMIC) which is currently developing Intelligent Traffic Monitoring services ‘Masarak’?

Qatar Road Safety Studies Center is a new center, the current collaboration agreements are mainly with the National Committee for Traffic Safety, chaired by His Excellency Sheikh Abdullah bin Nasser Al Thani, Prime Minister and Minister of the Interior, and we are strongly represented in the committee.

I am currently the Chairman of the Research Committee in the National Committee for Traffic Safety, which includes members from the country's various institutions. As a national research think tank, we are striving to become the research arm for this committee and provide it with all required traffic research.

That said, our focus now is not on intelligent systems as much as on studying traffic problems, especially investigating the common causes of accidents, the types of cars involved, whether they are equipped with safety measures, as well as on raising the public's awareness of traffic safety. Our next step will then be to cooperate with QMIC on developing special studies on the use of technology to understand the causes of traffic accidents and find effective ways to reduce them

Could you please tell us about the research being carried out by the Road Safety Studies Center?

There are many studies and research projects that are under evaluation and execution, including a study on the impact of traffic accidents on Qatar's society and economy. A study entitled, “Towards the best practices and sustainability of traffic safety on Qatar University's campus” was concluded last June. Other studies include: “Analysis and Development of Speed Bumps in Qatar”, “Analysis and Simulation of Traffic Jams

and Safety on Doha Expressway 2013”, “Prediction of Traffic Accidents in Qatar in the Year 2022”, which is based on a study of the increase in population and the associated increase of cars in Qatar, “Analysis of the Cost Caused by Traffic Jams”, and “Black Spots in Qatar”, which focuses on the areas with high rates of traffic accidents.

In addition to further research projects the center will be working on in upcoming years, we are establishing a traffic accidents laboratory, and are collaborating with the National Committee for Traffic Safety to establish a database of all studies conducted in Qatar and GCC countries on traffic safety.

The center also has non research-oriented activities which include hosting a number of seminars, as well as organizing a number of activities during United Nations Global Road Safety Week. The center has also launched a national video competition for university and school students on traffic safety, along with an essay contest for schools on pedestrian safety to raise the youth's awareness of road safety principles.

You have mentioned a study on traffic black spots, which focuses on areas with high rates of traffic accidents. Where have these spots been identified in Qatar and how many are there?

For example, one identified black spot in Qatar is the Mesaimmer intersection leading to Barwa city, as it has a very high rate of traffic accidents. This study focuses currently on the city of Doha, but there is another study on the safety of roads leading to Ras Laffan city, which is determined by black spots identified and updated over the past few years. By identifying these areas, we can then analyze the common reasons of traffic accidents, such as the road infrastructure, road exits and/or set speed limits.

How do you identify traffic black spot areas?

Generally speaking, traffic black spots are areas with high rates of fatal accidents that lead to deaths or serious injuries, and/or serious damage to public or private property. The recurrence of accidents in a specific place labels the area as a danger zone, and requires a study to be conducted to discover the common causes of these accidents.

What are the most important current studies that address traffic issues? For instance, are there studies on traffic jams and accidents on February 22 Road? What are the primary reasons behind the traffic jams on this road?

I believe that there are planning and design issues, and the center is now in the process of creating a computer stimulation to identify the entrances, exits and capacity on this road. The problem also lies in the fact that this road was established back when the country's population was lower than it is now, and the infrastructure of the road did not take into account the potential increase in population. The country has experienced a boom in population because of its vast infrastructure projects which call for the recruitment of large numbers of foreign workers. It is worth mentioning that Ashghal and other government institutions are currently evaluating all options to overcome the complications of this vital road.

What other roads in the country pose the same issues and will face similar challenges as February 22 Road?

The problem in my opinion is that road planning and building is done in sequences, while one project is being implemented, other projects are on hold until the initial project is complete. Salwa Road is one example.

We have organized a lecture in collaboration with the Ministry of Public Works Ashghal and Qatar Rail to shed light on future projects. I have to say that I am optimistic about these projects, and based on the studies I have examined, I believe that Qatar's infrastructure, including roads, will develop in the next five to six years and will fulfill the expectations of the people of Qatar.

But for the time being, we are facing serious traffic issues, which include poorly-planned roads, traffic jams and accidents. We are also facing an alarming problem with deaths caused by people being run over. One third of the total number of deaths in Qatar is a result of run-over accidents.

What are the reasons behind the increase in run-over deaths?

There are three main reasons behind the increase in run-over deaths; the first reason is reckless driving, where drivers do not abide by the speed limit. The second is the lack of pedestrian crossings. We do not have a system in place for pedestrian bridges to ensure safe crossings.

For instance, if we examine Qatar's longest roads, the North road or the D-Ring road leading to the Expressway, there isn't a single bridge for pedestrians; so people who leave the Mall or LuLu Hypermarket, are unable to safely cross to the other side of the D-Ring road because there isn't a pedestrian bridge in place.

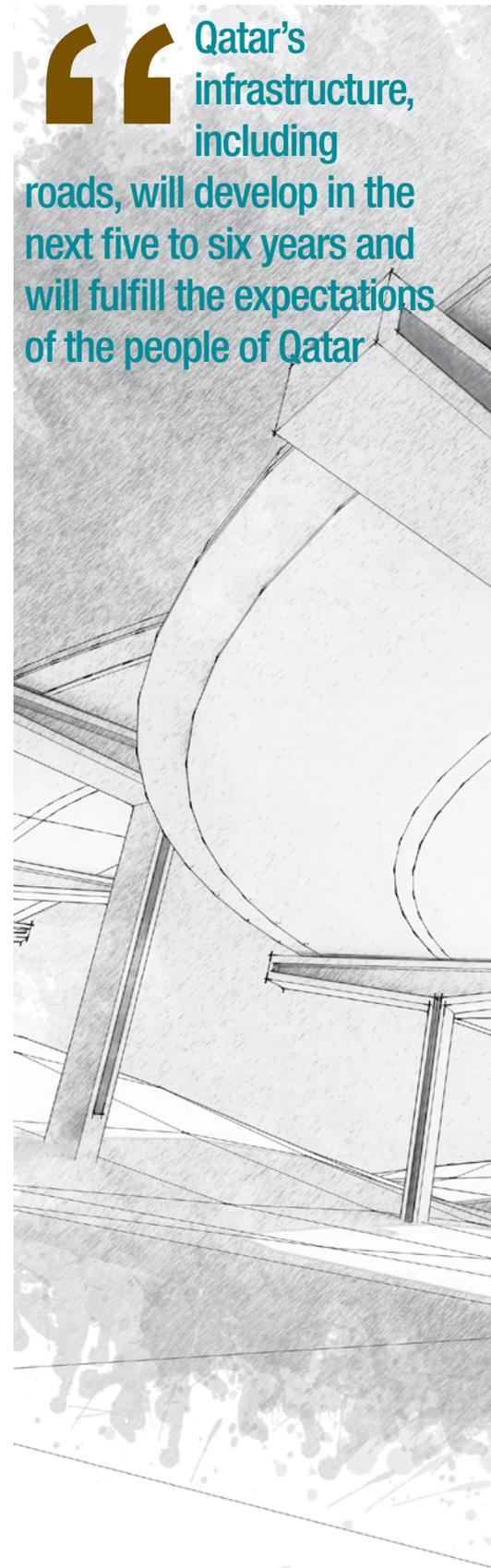
The third reason is that there are a lot of people, mainly unqualified laborers who are not aware of the necessary traffic safety laws.

What are the reasons behind the lack of pedestrian bridges in the capital city?

The issue lies in the planning of the roads, and during my discussions with the Ministry of Interior Affairs Ashghal and the Ministry of Municipality, they have stated that there is an intention to build some pedestrian bridges in Qatar. This is a pressing issue, because pedestrians put themselves in harm's way, especially those who visit large shopping centers, like City Center mall, where there are no safe crossings in place. The lack of proper sidewalks is another issue, with most sidewalks being narrow or obstructed by plants and trees which force pedestrians to walk on the sides of the road.

You have told us about your optimism about the developments of road infrastructure. Do you believe the traffic will reach a utopian state, clear of the current traffic jams once these projects are completed?

I hope so. The maps that I have seen, and the discussions I have heard in meetings have made me optimistic. However, we at Qatar University are an academic institution. We contribute with academic research and studies, and we do not take part in the execution or planning phases. And there are cases where we observe gaps between the planning and execution phases. Nonetheless, we hope that the future will witness better and smoother traffic throughout the country.





We hope that the future will witness better and smoother traffic throughout the country

There are many traffic studies centers in the world which have conducted a lot of studies, however, the world's most developed countries are still suffering from traffic problems. Do you think that the studies conducted here will allow us to achieve what has not been achieved by more advanced countries?

This question addresses infrastructure and urban planning and execution, which is not the center's area of specialty. Qatar Road Safety Studies Center focuses all its efforts on traffic safety. When it comes to the developed countries you have mentioned, research centers study ways to reduce traffic accidents, and if they succeed in saving a single soul, that is considered a major achievement.

For example, there is a partnership agreement between Qatar Road Safety Studies Center and the Malaysian Road Safety Research Centre, which is considered the largest and most important center in South East Asia. The agreement allows us to observe the performance and strategies of the Malaysian center when it comes to road safety.

Malaysia puts huge value on preserving human life. In the case of a traffic accident in Malaysia that leads to the death of more than one person (note that Malaysia's population is 30 million), a research team from the center visits the site and investigates the causes of the accident. Then, the center sends an extensive report of the accident directly to the Prime Minister's office, not to the traffic headquarters. That is because traffic police do not possess the engineering skills and qualifications to conduct the investigation. Whereas a specialized team will be able to provide an accurate report and support it with the necessary facts and photos, which may lead to changes in the country's systems and procedures to save people's lives.

Do you think that the Malaysian model, with such diligence to study the details of traffic accidents, is the best model to emulate?

To better explain the idea, I will give you an example; there was a tragic accident that involved a tourist bus in Malaysia. The bus turned over and resulted in the death of 16 foreign tourists.

The Malaysian Parliament immediately requested a report from the Ministry of Interior Affairs which in turn sent the specialized team to investigate the causes of the accident.

After an extensive study that lasted one month, the team issued a detailed report of the accident which contained their observations and recommendations. The report stated that the bus was heading onto the highway, and it overturned when it reached a bend which was separated by roadside concrete blocks.



We study traffic jams and safety on Doha's Expressway

The report explained that the concrete blocks do not absorb shock, and as a result the parliament issued drastic changes to address all the circumstances that led to the accident, which were implemented immediately.

I mentioned this example to illustrate the importance of scientific research and that the state should support and employ scientific research in solving the problems and challenges facing our society, and to point out that studies are only beneficial once implemented. So the state must pave the way for research studies to be implemented.

This is precisely the mission of the Road Safety Studies Center at which we aim to service the community with research studies and help the authorities to make the right decisions. Qatar Road Safety Studies Center does not execute, but researches; we send our scientific observations and recommendations regarding traffic issues to the decision makers of the country.

There are traffic jams that paralyze the traffic in some areas which has resulted in withholding on driving licenses for certain professions for Qatar's residents: what do you think is the best way to address traffic jam issues?

We will be organizing a seminar titled: "Traffic congestion in Qatar, the causes and solutions" to discuss this issue. Aside from the aforementioned causes of poor planning and delays in project executions, roundabouts tend to be among the major causes of traffic jams. I for instance live in Al Rayyan, and the distance between my house and my work at Qatar University is only 16 kilometers. And there are 15 roundabouts in this short distance, which causes serious traffic issues. Roundabouts are an old traffic design and they have recently become ineffective with the increase of population, they represent a bottleneck, whereas if one roundabout experiences a traffic jam, the rest of roundabouts in the area get affected, and may result in closing roads to residential areas that may not have other exists.

Qatar is on the verge of traffic revolution, and the Rail will be one of Qatar's most prominent landmarks. What is your future outlook with regard to traffic safety?

As I have already mentioned, reported traffic accidents is a local and global issue, and there are serious efforts done by the highest levels in the state to find solutions for traffic issue and accidents. This is evident in the establishment of the National Committee for Traffic Safety, chaired by His Excellency Sheikh Abdullah bin Nasser Al Thani, Prime Minister and Minister of the Interior in 2010 to direct the efforts for the development of road safety programs in the country.

The committee has developed the national strategy for traffic safety which will be implemented through the National plan for traffic safety. The plan includes around 200 practical steps which will be implemented throughout the upcoming years by 13 government and semi-government institutions from multiple field and disciplines. There are also efforts to establish a more efficient public transportation system. We hope that all these efforts will play a role in solving traffic problems and contribute to the development of traffic safety in our country. Qatar Road Safety Studies Center is committed to fulfilling Qatar's National Vision 2030 and to contribute by conducting scientific research studies to make Qatar a safer place for Qatar's citizens, residents and visitors.

News

Pharmacy undergraduate students work towards new porous elastomeric matrices for use in tissue engineering



Dr. Husam Younes supervising the directed research project

with the Canadian Council for Accreditation of Pharmacy Programs (CCAPP) accreditation standards and guidelines for a baccalaureate degree program in pharmacy.

“This was a unique and enjoyable research experience that we would have never been offered somewhere else in our studies,” Duha and Nada said, adding: “The project enhanced our research skills and our ability to execute bench work related to the design and characterization of three-dimensional scaffolds intended for use in tissue engineering and other controlled drug delivery applications. We were able to gain practical ability in conducting scientific literature reviews, data collection, data management, analysis, interpretation and presentation of such scientific work.”

Dr. Husam Younes, the supervisor of this undergraduate research project said: “I am really proud to have Duha and Nada as part of the undergraduate students’ team who conducted this segment of the project, which intends to use a pore-forming agent to generate new porous elastomeric matrices capable of facilitating the growth and proliferation of stem cells for use in tissue engineering applications in general and for cartilage repair in particular.”

Dr. Younes added that the directed research project constituted a short but a very important part of the research activities that Qatar University is currently carrying out in relation to the pharmaceutical and biomedical applications of the novel poly (diol-co-tricarballate) elastomers, which are patented under the College of Pharmacy’s PPDDRL laboratory.

“Over the last three years, our research laboratory has been generously granted almost 2.4 million dollars from Qatar National Research Foundation through its National Priorities Research Program (NPRP) and The Undergraduate Research Experience Program (UREP),” he continued.



Pharmacy students with research team members

Qatar University’s series of directed research undergraduate courses continues to nourish its pharmacy curriculum and offer unique hands on experience to students. Duha Al-Najjar and Nada Khudair were two of the third year pharmacy students who recently completed their directed research project entitled “Preparation and characterization of thermally crosslinked macroporous elastomeric scaffolds”. The project was conducted under the supervision of Dr. Husam Younes, Associate Professor of Pharmaceutics and founder of the Pharmaceutics and Polymeric Drug Delivery Research Laboratory (PPDDRL) at the College of Pharmacy.

This research work was part of fulfilling the requirements of Pharmacy Elective I (PHAR445) course, which is the first in a series of successive directed studies courses for third and fourth year pharmacy students. The course, coordinated by Dr. Daoud Al-Badriyeh, was designed to comply

Our Partners

QU and partners celebrate success of novel desalination technology Collaboration with ConocoPhillips, Kahramaa and QEWC



Qatar University's College of Engineering, ConocoPhillips, Kahramaa, and Qatar Electricity and Water Company yesterday celebrated the successful completion of the second phase of a joint research project designed to demonstrate a novel technology for seawater desalination.

QU President Prof. Sheikhha Abdulla Al-Misnad, and representatives from each organization attended the celebratory event which was held at Qatar University.

The Membrane Distillation Field Demonstration joint project started in October 2011 and was hosted in the Chemical Engineering department. It has made important progress towards proving that quality freshwater can be produced from brines discharged from thermal desalination plants using low grade waste heat from industry and/or renewable sources.

Funded by ConocoPhillips through its Global Water Sustainability Center (GWSC) in Doha, the project focuses on evaluating membrane distillation (MD), a novel desalination technology that evaporates water at low temperature and pressure and

passes it through a membrane before condensing it to produce distilled water. The technology uses less energy, has a lower environmental impact and is less costly than conventional methods for desalinating high salinity brines.

QU VP for Research Dr. Hassan Al-Derham said: "The success of this joint project has contributed significantly to major advances in the knowledge of this emerging technology, demonstrating the strides Qatar University is making in its mission to address relevant local and regional challenges through research. A solution to Qatar's shortage of freshwater is a high priority in the Qatar National Development Strategy, and this cooperation between key members of the nation's industrial and educational sectors is crucial as we strive to deploy innovation as a tool to build a knowledge-based society in line with Qatar National Vision 2030."

ConocoPhillips Qatar President Mr. Gary Sykes said: "We are proud to be in the driving seat on such an ambitious and innovative endeavor and to be joined in our enterprise by such distinguished academic and industrial institutions in Qatar. MD is an

emerging hybrid thermal-membrane desalination process that uses heat to produce distilled water without requiring significant additional energy input. To my knowledge, this is the first field testing project being done in the Middle East and arguably in the world for such a unique application of MD technology."

Phase 1 of the collaborative efforts included pilot tests conducted at QU to prove the technical feasibility of the MD process. In collaboration with QEWC, Phase 2 saw the units operating at the Ras Abu Fontas power and desalination plant to evaluate the process under industrial conditions. A waste heat audit was conducted to identify opportunities whereby the energy needed by MD could be obtained from sources within two Qatari desalination facilities.

The joint project was managed by CENG faculty Prof. Farid Benyahia and GWSC Managing Director Dr. Samer Adham to develop expertise in this emerging technology, resulting in two Masters' theses at Qatar University and several conference and journal papers, which have been published or are under review for publication.



Dr. Farid and Dr. Samer Ras Boufantas pilot plants

QU's team included research assistants Yehia Manawi and Ahmad Fard, who successfully completed the Master Program in Environmental Engineering in September 2013 with thesis on membrane distillation desalination. A Qatari Master's student Mashael Al-Obaidli has also joined the team. Her project will investigate the long-term stability of membranes and contribute significantly to the third and final phase of the project, which will be carried out at QU until August 2014. This phase involves using laboratory data to improve the modeling of the MD desalination process.

Prof Benyahia said: "This joint project has been a tremendous opportunity to engage in a research area that is so important to Qatar and the region and involve graduate students in the College of



Pilot plants Ras Bou Fantas

Engineering. The knowledge and experience the QU team acquired has been phenomenal and will definitely pave the way for establishing regional excellence in this emerging desalination technique. I honestly think that this type of collaboration between academia and a world-class company based in Qatar is exemplary. We are also very grateful to QEWC and Qatar Power for their support to our graduate students and access to their power and desalination facilities".

Dr Adham said: "Our field testing of MD in Qatar confirmed that the technology can increase the productive capacity of desalination plants without the need for capital and operational costs associated with the establishment of additional infrastructure to draw water from the sea to the

desalination plants and to the initial processing of these waters. Thus, we can get a higher output of fresh water from desalination plants currently in Qatar with lower costs and a reduced amount of energy that will in turn have a positive impact on the environment".

CENG Dean Dr Rashid Alammari added: "This project enhances the research collaboration between the College of Engineering and industry, and is also aligned with Qatar National Vision 2030 for applied research that benefits Qatar. It involves faculty and students -- the knowledge and experience of our faculty and ConocoPhillips will be disseminated to our graduates who will continue the country's development of water desalination technology".

News

Dr. Ahmed Awaisu Involved in Building Pharmacy Practice Research Capacity of Hospital Pharmacists in Oman

College of Pharmacy faculty, Dr. Ahmed Awaisu was recently involved in a three-day research capacity building workshop for pharmacists in Oman. The workshop, entitled "Introduction to Research Methodology for Pharmacists", was organized by the Directorate General of Medical Supplies, Ministry of Health, Sultanate of Oman.

Dr. Awaisu conducted the workshop along with Dr. Mohamed Azmi Hassali (Associate Professor and Deputy Dean of Student Affairs and Networking, School of Pharmacy, Universiti Sains Malaysia) and Dr. Fahad Saleem (Senior Lecturer, School of Pharmacy, Universiti Sains Malaysia).

The training was primarily intended to impart basic skills in research methods and biostatistics

to novice researchers, especially in pharmacy-related areas and to provide motivation and impetus to get the pharmacists started in conducting research.

The ultimate goal is to use research evidence to influence changes in practice and health outcomes of the population at large.

The three-day workshop was conducted in an interactive manner and was overwhelmingly attended by about 40 Omani pharmacists working in various hospital and primary healthcare settings. The participants believed that the training was very successful and achieved its goals of providing basic skills in planning and conducting pharmacy practice research.



Dr. Ahmed Awaisu

News

Qatar University marks UN Road Safety Week focusing on pedestrians



School Students during the event

Pedestrian safety was the focus of a campaign launched at Qatar University (QU) to mark the 2nd United Nations Global Road Safety Week.

The two-days of talks, presentations and demonstrations were organised by Qatar Road Safety Studies Center (QRSSC) in the College of Engineering and sponsored by Maersk Oil, with the aim of encouraging students, faculty and staff to drive more carefully and help reduce the number of pedestrian deaths as a result of road accidents in Qatar.

It included talks by Hamad Medical Corporation's Director of Trauma Critical Care Dr Ahmad M Zarzour and Head Nurse Asma Mosa and Capt Hassena Al Ali and Lt Abdulwahd Al Anizi from the Traffic Department at the Ministry of the Interior, in addition to the QRSSC.

Qatar Road Safety Studies Center was established in September 2012 at QU and is the only research center in Qatar working in road safety research. It collects and shares information related to road safety and accident prevention in Qatar by conducting studies, research and analysis and evaluation of road accidents in order to identify the root causes of accidents and critical factors that have a major effect on the reduction of accidents.

In line with the UN's international campaign, the Center's Director Dr Khalifa Al Khalifa outlined three areas of study on which the center is currently focusing — a general pedestrian safety awareness campaign; a national survey of pedestrian attitudes and behaviors, to get a clearer picture of the scope and magnitude of pedestrian activity and the public's behaviour and attitudes; and a pedestrian road safety audit.

A pilot audit of driving violations which affect pedestrians has already taken place on QU campus.

Dr Kahlifa said: "Optimal road safety is a crucial aspect of Qatar's development, and the QRSSC is involved in many projects which campaign to raise awareness of the importance of driving safely and being pedestrian aware. We need to make sure the message is getting out clearly that we are all responsible for cutting Qatar's fatality rate for road accidents."

To raise road awareness among primary and secondary school pupils and university students in Qatar, the center has also launched a series of competitions including writing articles, designing posters and establishing an Instagram contest, all on the theme of pedestrian road safety.

Student in the Limelight

Iman Abdelaziz



About the College of Pharmacy

The College of Pharmacy at Qatar University is a Canadian-accredited program which currently offers a 5-year BSc (Pharm) degree, a Doctor of Pharmacy (PharmD) degree program and a Master Science (MSc) degree program. The college supports the Qatar National Vision 2030 goal of providing quality postgraduate education opportunities by being the first college in Qatar to offer these post-baccalaureate health sciences degrees.

The College of Pharmacy's vision to be the "leading pharmacy school in the Middle East region" is exemplified in their accomplishments. The college's mission is to prepare students to provide optimal pharmaceutical care and advanced healthcare outcomes to promote research and scholarly activity and to serve as the pharmacy resource for Qatar, the Middle East and the world.

The College of Pharmacy aims to provide its graduates with the knowledge and skills necessary to become competent pharmacists and to meet the healthcare needs of this society. To date, the college has graduated 52 BSc students and 19 PharmD students.

Why did you choose to pursue a Master's degree at Qatar University College of Pharmacy?

I completed my bachelor's degree in Pharmacy and Pharmaceutical Sciences back in 2010. Like most fresh graduates, I was ready to be a part of the work force. My search directed me to a career path in a primary health care pharmacy setting. Although being a member of Qatar's healthcare system was rather fulfilling, a need to become involved in the drug discovery process evolved. This occurred at the same time Qatar University College of Pharmacy was launching the Masters of Pharmaceutical Sciences program. My decision to enroll in the MSc (Pharm) was one of the most rewarding decisions. I am happy to say that I am currently a couple of months shy of defending my thesis, one which I know is of great relevance to understanding cardiovascular diseases and potential therapeutic targets.

Please tell us about your university studies.

In the first semester of the first year of the program, I was enrolled in numerous courses revolving around Pharmaceutical Sciences. The topics that I was most passionate about were those related to Pharmacology. Examining drugs on the market or drugs being investigated for usage in the treatment of diseases in both humans and animals is what intrigued me the most.

I remember the first time I set foot into Dr. Fatima Mraiche's Pharmacology laboratory and we discussed her current National Priorities Research Program-funded project on heart failure, I knew right away that I had found my home. In the second semester of the first year, following much emphasis on coursework, I began to work on my MSc thesis project. During the summer of my first year, I completed a two-month internship at the University of Alberta, Edmonton, Alberta, Canada, which allowed me to carry out some of the experiments that were part of my MSc thesis project.

You mentioned that you took an internship; can you tell us about it and the skills you gained?

This experience was priceless as it allowed me to develop new basic science techniques including isolating neonatal rat ventricular cardiomyocytes, viral tools to upregulate our genes of interest and characterizing cardiomyocytes following infection. This experience also allowed me to work along side other members of the cardiovascular research team at the University of Alberta. I also represented Qatar University and the College of Pharmacy at the Women in Scholarship, Engineering, Science and Technology (WISEST) Networking Fair.

How were you able to apply the skills you learned at Qatar University?

During my internship, I had the chance to further understand the challenges facing patients with cardiovascular diseases and the current scientific findings. In addition, I was exposed to various research laboratories working towards the same goal, identifying an ideal therapeutic target for cardiovascular diseases. Upon my return, I was very eager to work with my colleagues and teach them some of the skills that I had developed.

This included using viral tools to enhance gene expression and using our high-end PTI Fluorometer. In addition to continuing to optimize some of the techniques that I have learned in Canada, I had to learn new techniques to address the other objectives of my MSc thesis project. My internship has also allowed me to connect with other female scientists in training.

This has resulted in a Qatar University_MSc WISEST Twitter account, a discussion forum for women in Science in Qatar and Canada. In this forum, the aim is to bridge the gaps and be able to discuss research, challenges and collaborative opportunities.



What are the challenges you faced during your studying experience? And how were you able to overcome them?

At first, it was a bit difficult for me to balance my academic life with my personal life. With time, I learned how to organize my time and most importantly to prioritize the tasks at hand.

Being a strong Arab woman in a male-dominated field was also quite challenging. However, I am inspired by the leading women surrounding me in Qatar and at Qatar University. As such, I promised myself I would make the best impression I could of Arab female researchers, locally, regionally and internationally.

Did you attend any conferences or seminars?

For science to be translated from papers into the real world, it is essential that research findings are disseminated. I was quite fortunate to have had this opportunity. I attended and participated in several conferences and seminars including the College of Pharmacy's second and third Annual Student Research Evenings, where I presented my findings in the form of oral and poster presentations.

More recently, I shared some of my findings with my MSc colleagues from diverse graduate programs at Qatar University during the first Annual Graduate-Faculty Forum. This was also where I was awarded first place in the Graduate Studies Award for Outstanding Scholarship & Research in Science. I have also presented posters locally at the Hamad Medical Corporation Annual Research Day, and regionally at the fifth International Conference on Drug Discovery and Therapy which was held in Dubai. Most recently, I attended and presented my most recent findings in the form of a poster in the International Society for Heart Research World Congress XXI held in San Diego, California.

Tell us about your future ambitions and plans.

I am looking forward to becoming an active member of Qatar's scientific society and pursuing a PhD degree in the near future. I aspire to continue to work to understand the magnificent human body, in the hope of identifying novel therapeutic targets, which is critical to address the health challenges at hand.

Research Success Story



Dr. Asmaa Al-Thani:
“Our support for this research project upholds the university’s vision and enhances the partnerships we have formed to meet the challenges of health in the community.”

Research project embraced by Qatar University bears fruit

A unique research project which could save the lives of seriously injured people is being conducted by Dr. El Rasheid Zakaria, a Consultant of Medical Research at Hamad Medical Corporation, and has been embraced by Qatar University, with the support and help of the research team at the Department of Health Sciences, led by Associated prof Dr. Asmaa Al-Thani, Head Of Department of Health Sciences, Dr. Abdul Rahman Jamal, Assistant Researcher, and Dina Al-Sayegh, Research Assistant. This research project aims to revive patients suffering from acute and uncontrolled bleeding through the use of a new technique that works to control and minimize the consequences of the bleeding and thus gives the patient a greater chance of survival. Dr. Asmaa Al-Thani said, our support for this research project upholds the university’s vision and enhances the partnerships we have formed to meet the challenges of health in the community.

Dr. Zakaria expressed that this project will change the current practices of treating patients since it limits and reduces the rate of deaths caused by severe and uncontrolled bleeding, which is one of the leading causes of early deaths in Qatar and other countries, especially in the case of uncontrolled life-threatening acute bleeding caused by traffic accidents and other fatal injuries. In the following lines, he explains the different stages of the research project and the challenges that the project has succeeded in overcoming, in addition to the medical benefits provided by the material that has been discovered.

Early Stages of Research

Dr. Zakaria said he would divide medical research into three sections, the first section is basic biomedical research, the second is applied research, and the third is clinical or translational research, which is the application of the results of the first two sections of scientific research on animals, before applying it on

humans. No research center in the world operates without the three sections together, thereby acting on all three in parallel.

It should be noted that all the big discoveries result from basic biomedical research. As evidence, the highest award in medicine, which is the Nobel Prize, has been awarded since its launch in 1901 to discoveries in basic biomedical research. That is why the Nobel Prize changed the name of the award from “Nobel Prize in Medicine” to the “Nobel Prize in Physiology and Medicine”. Therefore, scientists interested in physiology and organ function research are the most frequent recipients of this award throughout its long history since its inception.

He said: “When I first came to Qatar three years ago, I initiated research in the field of basic biomedical research, since it is an important field, I began my work by contacting associated parties including Qatar University, which was the only institution that welcomed and supported the establishment of basic biomedical research in Qatar. Once we embarked on this project we found support from the Department of Health Sciences, Faculty of Arts and Sciences at Qatar University, specifically from the Associated prof Dr. Asmaa Al-Thani and her team.”

Research Steps

The first step in the research project was developing the plan, while the second step was obtaining financial support for the basic biomedical research projects, and we succeeded by acquiring financial support from Qatar National Research Fund for the first two basic biomedical research projects ever to be awarded in the State of Qatar. Then we started to bring the tools and scientific instruments and medical equipment necessary to conduct the two research projects.

Dr. Zakaria stated that the requirement of these two projects was to conduct experiments on laboratory rats, where Qatar University played an instrumental role in providing the space to conduct this type of research for the first time in Qatar.

Two Research Projects are in Process at Qatar University

Dr. Zakaria spoke about the first research project, which is related to patients suffering from end stage Kidney Disease. When a kidney fails, patients undergo one of three types of treatments: first and foremost: peritoneal dialysis, and secondly:

hemodialysis, which is relatively high in cost and known as “alternative kidney”. The third treatment is a kidney transplant to replace the failing kidney. Even though Qatar has a small population, there are more than 200 patients suffering from end stage kidney disease on peritoneal dialysis. Most patients in Qatar prefer the peritoneal dialysis treatment because of its advantages; where the patient does not need to go to the hospital because peritoneal dialysis can be done at home, allowing the patient more freedom of treatment than hemodialysis treatment, which takes a minimum of nine hours every week in three treatment sessions. However, the main challenge for peritoneal dialysis treatment is that after about five years of dialysis, the treatment will not be effective enough. Most researchers believe changes that can occur in the peritoneum are the main reason disturbing the effectiveness of this treatment. Nonetheless, the causes of these changes are still unclear and have not been studied thoroughly.

Dr. Zakaria added that some researchers believe that the main causes of these changes lie in the elements of the dialysis itself which lead to changes in the

the changes in long-term peritoneal dialysis. This is in addition to the presence of urea and accumulated uremic toxins in the blood which affect the efficiency of peritoneal dialysis treatment after a period of time.”

Since kidney failure means the loss of the ability of the kidney to form urine filtering, wastes and excess fluids from the blood, which would be excreted in the urine, are transmitted to and accumulate in the blood, which affects the body's organs including the peritoneum, which loses its properties to purify the blood of toxins and urea.

Dr. Zakaria spoke of the second research project which received the second grant from Qatar National Research Fund and explained that the project is on uncontrolled life-threatening acute bleeding, which results from traffic accidents and other fatal injuries. These accidents are considered the main cause of death in young people less than 40 years of age, which is considered a serious problem because they are the backbone of the economy in any country, and they represent the active masses of the country's demographic and economic activities.

Deaths that result from acute bleeding do not only occur in Qatar, rather this is a worldwide issue where uncontrolled life-threatening acute bleeding is considered the main cause of death in the first few hours after an accident. Therefore, doctors focus all their efforts on stopping the bleeding, which is usually done through surgery. Once doctors succeed in stopping acute bleeding, they then attempt to revive the patient by giving solutions such as blood or plasma, salt or other solutions given intravenously to compensate the blood that the body has lost in the accident.

The quantity of these solutions given to the patient depends on the degree of bleeding. A normal human body weighing about 70 kilos has a total of five liters of blood, and patients will be compensated according to the amount of lost blood. Statistics state that if doctors succeed in stopping the bleeding of a patient that has lost 500 cubic centimeters of blood because of an accident or any other reason, the patient will survive. However, difficulty arises if a patient loses one liter of blood, especially if it is lost in a short period of time, which reduces the chances of survival and doctors will have to determine which solution should be used to compensate for lost blood: salt solution, plasma or blood.

**“ New
technique
works to control
and minimize the
consequences of
bleeding and gives
the patient a greater
chance of survival**

peritoneum, thus affecting the effectiveness of the peritoneal dialysis treatment. “Based on previous research we have conducted in this field, we had another idea, which is that these changes occur because the body reacts to the permanent catheter that we insert into the patient's abdomen to conduct peritoneal dialysis as a foreign body. That said, I believe that the catheter used is the main reason for

Research Success Story

Nonetheless, most of these attempts fail to save the patient's life in many cases of uncontrolled life-threatening acute bleeding because there are no revitalization methods that exist for these cases, and here lies the importance of this research, as it aims to find new ways to revive the patient and provide a greater chance of survival.

There is another stage where a patient loses a liter and a half of blood, followed by the fourth stage, which doctors label as the most dangerous, where a patient loses two liters of blood or more from an average total of five liters in the human body. Dr. Zakaria explained that the patient's body in this case, will automatically tighten blood vessels to increase the blood pressure, in addition to clotting factors to stop bleeding, and this coagulation is one of the defenses that the human body resorts to automatically and naturally to stop the bleeding.

What happens is that in the case of uncontrolled acute bleeding, especially in a short period of time, all means of natural defense abilities fail to stop the bleeding because of a lack of energy to supply the body organs. It is known that any organ of the body is made up of millions of cells, and each cell, functions as a standalone unit which contains mitochondria that produces energy for the body. Every cell needs oxygen to produce energy, thus, each cell must receive part of the oxygen that the body breathes, and in the case of acute bleeding, the process of transferring oxygen to cells will be affected, which interrupts energy production processes and results in disturbing the body's internal functions.

We find that the body contains a system to automatically produce energy. In normal cases where there is oxygen, every glucose molecule produces 36 units of energy, whereas in cases where there

is a lack of oxygen supply, every glucose molecule produces two energy units which is insufficient to maintain body functions. There are of course chemical compounds to substitute for energy units, however the problem lies in the fact that the cell wall does not allow the passage of the injected energy units into the cell.

Thus, it is necessary for us to work to find a solution to overcome this barrier. In collaboration with a company in the United States of America, we have produced a substance extracted from eggs which undergoes special processing to construct so-called "vesicles" that have the same chemical features as the human cell wall. We then load the vesicles with a high concentration of energy units.

At this stage the vesicles containing the high energy load are ready for use. When required for resuscitation of a patient suffering from massive bleeding, the vesicles containing the high energy load are mixed with the resuscitation salt solution, and injected intravenously. Once in the blood stream, the vesicles containing the high energy load come in contact with the cells. As their chemical structure is similar to the human cell, they fuse with the cell membrane and empty their high energy load directly inside the cell. This will provide for with the energy required for biological functions of the cell.

Enough Rescue Time

Addressing the question of how much time this substance, produced from eggs, gives to save the life of a patient who has lost about two liters of blood, Dr. Zakaria, explained that what happens is that a patient at the fourth stage of acute bleeding will be given blood, plasma, salt solution and/or oxygen. However, the body's self-resistance fails and within half an hour, the heart may stop working.

Doctors continue resuscitation attempts by giving the patient an epinephrine injection sometimes to the heart, but the truth is that all these are desperate attempts to rescue the patient because once the patient loses the ability to compensate for lost blood and energy; the chances are very high that they will die within an hour. However, the method that Dr. Zakaria has found has completely changed these results, because it enables the body's cells to function by providing them with alternative energy units that are not produced in the body due to the loss of blood and thus lack of aerobic respiration.

Nonetheless, Dr. Zakaria said that the research could not be applied directly on humans, it was necessary to go through an experimental phase to test the results



of this treatment on laboratory animals mice. And this exactly what the current project is doing.

In this regard, Dr. Zakaria said: "We took two groups of a laboratory rats, and caused them to bleed to the fourth degree, which is similar to what happens to an injured man who has lost two liters of blood. Note that there is a difference between the amounts of blood in a human body, compared to the amount of blood in a rat: an average human body has five liters of blood whereas the rat has only 12 cm³ of blood. Thus, we suck about 4.8 cm³ of blood from the rat to get it into the fourth stage of acute bleeding. In one group of rats we have applied the regular treatment, that is similar to the treatment applied on human victims, which includes blood, plasma and salt solution injections along with the heart revitalization attempts.

“We constructed vesicles from egg and loaded them with energy units. The vesicles fuse with human cells in contact, and deliver their high energy load directly inside the cell”

“

The new technique could preserve human organs destined for transplant for longer period of time

However, all of these attempts can only preserve the life of the rat for 15 minutes to half an hour in the best cases.

“In the second group of rats, we applied the regular treatment exactly as in the first group; and in addition we supplemented the resuscitation salt solution with the vesicles containing the high energy load using the method we have discussed, which successfully extended the rat’s life for three hours, with good blood pressure. “We believe that the rat would survive for an even longer period of time; however the protocol of the ethical committee of scientific research prevents research projects from getting the animal to the degree of serious health deterioration, and to comply with the protocol, we did not wait for more than three hours to avoid unnecessary stress to the animal.

“The innovative treatment that we have discovered to elude the repercussions of bleeding, will allow us more time to save the patient than the one hour provided by all other methods of treatment currently available for patients suffering from the fourth degree of acute bleeding, which is not sufficient to save the patient’s life, as cells lose the ability to produce energy.

“We will be able to save the patient’s life if we were able to activate the patient’s autoimmune system before he enters the critical stage of non-compensation where all treatment attempts will most likely fail. That is because the new method of treatment will provide the required energy for the cells to function, thus giving the surgeon appropriate and adequate time to save the patient’s life.”

Dr. Zakaria explained that if the life span of a person is 60 years, the life span of a rat is very short, thus, if the new treatment allows the rat three hours, then based on their life span ratio, it will allow humans much more than three hours. That is because one hour in a rat’s life is equivalent to days of human life. Therefore, the use of this new treatment on human patients will prevent them from reaching the stage of non-compensation, thus allowing doctors enough time to conduct surgery to save lives.

Application on Humans

Regarding whether this new treatment has been applied to humans, Dr. Zakaria states that the results of this research are entirely new, found only two months ago, and the next step prior to applying the findings on humans, is to obtain intellectual property, because this treatment method is very new and innovative.

Dr. Zakaria expressed his confidence in the success of this new method to treat acute bleeding which however has to undergo various stages of experiments to measure its effectiveness and ensure that it is risk-free before applying it on human patients.

Other Benefits

Dr. Zakaria explained that the results of this research will not only help to save patients who are suffering from acute bleeding as a result of accidents, rather it will save lives in cases of bleeding in general, including cases of women and childbirth, and cases of injured soldiers, where a syringe could be made available to the injured soldier so that he could inject himself to save his life until he is transferred to a hospital.

The other advantage of this treatment is that it does not lead to high blood pressure during resuscitation attempts, and at the same time provides the energy that the body needs.

He also revealed that there are other applications for this method, including its significant impact on wounds as it speeds the healing process, especially in diabetic patients. Other applications also include the conservation of human organs. For example, in the case of kidney transplants being transferred from China to be implanted into a patient in Doha, which requires a long time, the organs could be preserved in the substance for a long time without losing their vitality, unlike the substance currently used to keep these organs.

He also revealed a new application for this research, which includes some minor modifications to be made to the vesicles so it can be used in the treatment of hair loss and to help hair grow profusely in areas of the head that suffer from hair loss. Dr. Zakaria stressed that these two applications have been confirmed in the first stages in animals and also in humans.

He concluded by saying that the results of this research once showcased at specialized scientific conferences will result in a major change in methods in the treatment of bleeding and its implications, and the methods applied to revive the patient.

Our Partners

MoUs bolster QU's links with training centers

The College of Engineering at Qatar University (QU) has signed agreements with the Netherlands Organisation for Applied Scientific Research (TNO), Qatari American Council for Professional Education (QACPE) and Management Training and Consultancy Ltd (MTC) to support training and research at Qatar University's Gas Processing Center (GPC).

Commenting on the agreements, Dr. Rashid Alammari, Dean of the College of Engineering, said: "The GPC is well positioned to partner in this important collaboration with TNO, QACPE and MTC which underlines our commitment to contributing to the realization of Qatar National Vision 2030, the National Development Strategy 2011-2016 and the National Research Strategy. Our students and faculty will benefit considerably from the support emanating from these agreements."

The GPC-TNO agreement establishes collaborative applied research initiatives, training and educational programs. The specific interests of the agreement concern the activities of the GPC and focuses on natural gas processing, CO₂ capture to reduce greenhouse emissions, novel water treatment solutions, multiphase-flow and hydrates.

Under the terms of the agreement, the two parties will work together to design, build and commission a pilot plant which studies the performance of chemical solvents for the removal of CO₂ from different gas sources. The plant will operate at Qatar University and can be used to



From the left Sheikh Jaber Bin Mohamed Bin Jasim Al-Thani, Qatari American Council for Professional Education (QACPE) Chairman and Dr. Rashid Alammari, CENG Dean

develop key knowledge and technology related to natural gas treatment, a vital issue for the energy sector in Qatar. The agreement is an affirmation of the growing partnership between Qatar University and TNO, which over the past two years, has included the publications of joint papers, organizing workshops and discussing collaborative research in various areas.

TNO Managing Director Middle East Qatar branch office Mr Anton Leemhuis said: "TNO has an extensive track record in research and technology development programs for CO₂ capture technologies. Our growing Qatar branch office is instrumental in bringing this experience to Doha. I am delighted by the prospect that our work with GPC can support further industry collaborations with the world's leading LNG producer."

H.E. Mr. John Groffen, Ambassador of The Kingdom of the Netherlands, was honored to witness the signing of the agreement. "Qatar University is the leading national institution for higher education in Qatar and therefore a natural partner for TNO, a renowned research institute from the Netherlands with an office at Qatar Science and Technology Park," he said. "This partnership will lead to sharing knowledge and experience, and to the development of new innovations for the gas industry, which is a major economic driving force for both Qatar and the Netherlands."

Under the terms of the QU-QACPE agreement, the council will provide specialized technical courses for the gas industry, in the areas of:

management and leadership, project and contract management, human resources and training management, supply chain management, and health and safety skills.

QACPE will also provide professional certification programs according to national and international standards and guidelines approved by its international collaborators, which include Missouri State University (USA), The Professional Institute RisXcel London Ltd (UK), Management Development Institute (USA), and International Business Driving License (USA). QACPE will also support joint activities such as workshops and colloquia.

Under the QU-MTC agreement, the company will provide a number of training courses and activities. These include training in oil and gas field services, including health and safety, maintenance, and electrical and instrumentation issues, as well as corrosion and reliability engineering; training services for improved exploration and production performance for companies in oil, gas and petrochemicals; professional certification programs of the Chartered Institute of Purchasing & Supply, UK (CIPS) and the Chartered Management Institute, UK (CMI); soft skills courses for personal development, people management, and human resources. MTC will also support joint activities such as workshops, colloquia and other scientific activities.

News

Recycled Polymer and Natural Fiber Reinforcement for Concrete Research



Dr. Nesibe Gozde Ozerkan

A new high-performance composite concrete, stronger and durable than conventional concrete, has been developed at Qatar University's Centre for Advanced Materials (CAM).

The research, undertaken with support from Qatar Science & Technology Park, involved experiments and life cycle analysis of mortar samples that were reinforced with natural, virgin and recycled polymers.

The project was conducted under the supervision of Assistant Professor Dr. Nesibe Gozde Ozerkan and Associate Professor and CAM Director Dr. Mariam Ali Al-Maadeed.

"We found that concrete reinforced with low-density polyethylene (LDPE) and polypropylene (PP) has a lower environmental impact and high compressive strength," Dr Ozerkan said.

The basis for the study was the use of randomly-distributed fibers as reinforcement to delay the onset of tensile cracks and increase the tensile strength as well as the ductility of the basic concrete matrix. "Fiber-reinforced concrete (FRC), comprised of hydraulic cement, water, fine or fine

and coarse aggregate and fiber reinforcements, increases the speed of construction and may even eliminate the need for conventional reinforcement," she explained.

FRC is used in a range of specialized applications ranging from replacements for steel reinforcement in concrete, jackets for the retrofit of columns, externally-bonded reinforcement for the rehabilitation of deteriorating structural systems, and in all composite structures such as building frames and even bridge decks.

Though concrete structures are conventionally reinforced with steel rebars, they deteriorate when subjected to aggressive environments that combine moisture, temperature and chlorides, leading to corrosion of the steel.

"Fiber-reinforced polymer (FRP) materials such as rebars, when used as a reinforcing material for concrete structures, have higher resistance to corrosion, higher tensile capacity, and lower weight," Dr Ozerkan said.

Therefore, FRP may become invaluable for structures built in or close to seawater or in similar corrosive environments.

PP is one of the commonly-used fibers in industry for non-structural purposes such as slabs on grade, industrial floors, pavements and runways, though the cost of virgin plastics economically limits the percentage that can be added to concrete.

FRP-reinforced pavement requires less maintenance, its cement content and concrete cover over reinforcement can be reduced, and the reinforcement itself generates a smaller environmental impact.

The objectives of the study were to investigate the behavior of reinforced mortars experimentally, and to compare the defined fiber-reinforced mortar samples from an environmental point of view using life cycle analysis.

The mixtures of reinforced mortars were prepared at the construction laboratory of CAM, including a control mixture with no fibers, a natural fiber-reinforced mortar mixture, virgin and recycled polypropylene and low density polyethylene-reinforced mortar mixtures, natural fiber and recycled PP and virgin PP-reinforced mortar mixture, natural fiber and recycled PP and virgin LDPE-reinforced mortar mixtures.

In all mixtures, the fiber content was kept constant at 2 percent of mixes by weight. In addition, the water-cement ratio and cement content were kept constant as 0.4 and 500 kg/m³, respectively.

Mechanical testing proved that using virgin or recycled polymers (PP and LDPE) as the main reinforcements has a significant effect on the ultimate load the mortar can sustain, whereas natural fibers increase the volume of permeable pores resulting in very low durability in a harsh environment.

The goal of the life cycle assessment was to compare the environmental impact of the developed mortar mixtures reinforced with natural, virgin and recycled polymers (PP and LDPE).

The life cycle assessment, which focused on four selected obligatory impact categories identified as abiotic resources depletion, acidification potential, global warming potential, and human toxicity potential, concluded that the environmental impact of the manufacturing phase is very high for virgin resin, since monomer extraction and polymerization are highly energy intensive processes.

As the recycling process is not highly energy intensive, the recycled matrix is greener than the virgin material. The overall life cycle score indicated that both PP and LDPE-filled recycled composites are much friendlier to the environment than composites made of virgin resin.

Profile

Name: Ibrahim Ali Al-Haidose

Major: Mechanical Engineering

Occupation: Mechanical Engineering Laboratory Technician – Centre for Advanced Materials (CAM)



Ibrahim Ali Al-Haidose

What is your current occupation?

I conduct practical tests on engineering materials used in most research projects at the Center for Advanced Materials and to prepare reports and analysis of the findings.

When did you join the Centre for Advanced Materials (CAM)?

In 2010

Tell us about your field of study. Why did you choose this field?

Mechanical engineering specializes in the design, production and operation of machines and tools used in all fields. It also involves energy transfer and conversion. Mechanical engineering is a comprehensive field and has to do with all areas of life. I have chosen this field because of my interest in the practical aspect of research over the theoretical part, in addition to my interest in engineering materials in all forms, such as iron, aluminum, glass, plastic, cement and many others.

Do you have previous practical work experience before joining the Centre for Advanced Materials and what was the nature of your work?

Yes, I have worked for a brief period at Qatar Petroleum as part of a mechanical engineering internship working at the Department of Materials Technology. The nature of my work was to prepare reports on the engineering materials tested at the laboratory.

How did you apply for the Center for Advanced Materials?

I had heard of the center through family members, and I was very excited to join. I applied through Human Resources and was interviewed by the center's Director Dr. Mariam Al-Ali Al-Maadeed.

What is your favorite part about your field?

What I enjoy the most is that there is no routine in my job. We begin new research projects and we deal with new and different equipment. Most importantly, it is fulfilling my curiosity and love for knowledge through new discoveries.

What are the challenges that you face in your field?

Time plays an important part, and I must abide by it in order to give accurate findings which result in a comprehensive research project.

What skills have you gained from your work at the Center for Advanced Materials?

I have learned the spirit of collaboration and the true value of teamwork. I have also gained a range of scientific skills that I lacked prior to joining the center. One of the most important things I have gained is my interest in preserving the environment through a number of research projects like recycling the majority of materials such as plastic, paper and other engineering materials.



In addition, I have learned different machining processes such as the turning of iron and other minerals, measuring polymer mass flow, metal polishing and chemical processing. I have also gained the skills to operate the plastic sheet extrusion machine, in which raw plastic material is melted with the addition of natural fire to produce new plastic compounds with unique features, and many more.

Share with us your future ambitions in this field.

To conduct or participate in a research project in one of the areas of energy which will bring Qatar global recognition. I also hope to be able to take advantage of Qatar's sunny weather and conduct a scientific search to further develop solar cells.

What projects or experiments are you currently working on?

I am currently working on a plastic recycling project in which I enhance the plastic with other recycled materials and natural fibers such as palm fibers, in addition to a paper recycling project.

I am also working on projects that have to do with the erosion of metals as a result of the country's weather conditions, which includes looking into iron corrosion in collaboration with Qatar Petroleum, which is one of the most important current projects.

What training courses or workshops have you attended since you joined the center? Did they play a role in the development of your skills and what have you learnt?

I have attended two training courses: on the operation of the metal turning machine, and training in the principles of gas turbines and the processes and maintenance of gas turbines.

These two courses are among the requirements for the global accreditation ISO and were provided by the center. There were also two workshops: a workshop on safety in the event of a fire, organized by global safety organization Cup Fire, and a workshop on scientific report writing.

A final word to conclude and what advice would you share with the new generation of graduates?

I am thrilled by my work at the Center for Advanced Materials and I advise new graduates interested in various areas of scientific research to join the center or other research centers at Qatar University.

There is a promising future awaiting them in the field of scientific research because this is an auspicious field and it is receiving great attention and support by the State.

Scientific research helps the development of various aspects of life including environmental, economic and industrial aspects, and thus will have an impact on our lives consistent with Qatar's National Vision of 2030.

Our Research is Making a **BIG Difference**

Established in 1977, Qatar university has grown to over 14,000 students and 542 faculty members, building a regional center of academic and research excellence.

28.7%

compound annual growth rate (11-2007), making QU the fastest-growing university in Research in the Middle East.

1st

Qatar Biofuels Projects. Research to produce affordable, sustainable biofuels for the aviation industry.

\$220 million

awarded for faculty research projects including internal and external funding.

1,078

undergraduate students benefitted from Student Grants.

10

interdisciplinary research centers with world-class facilities.

45%

of the total funding under National Priorities Research Program (NPRP) is regularly awarded to QU.

133

research collaborations with leading institutions across the world.

480

current research projects.