

# OPAL



THE VOICE OF THE  
ENERGY AND MINERALS SECTOR

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## 2020: OPAL'S 'GOLDEN YEAR'

FEW WILL LOOK BACK ON 2020 AS ANYTHING BUT A CALAMITOUS YEAR RAVAGED BY THE CORONAVIRUS PANDEMIC AND A PROTRACTED ECONOMIC DOWNTURN. FOR OPAL, HOWEVER, IT WAS A STELLAR YEAR, CHARACTERISED BY, AMONG OTHER THINGS, NEW RECORDS IN MEMBER SUBSCRIPTIONS, THE ROLL-OUT OF FAR-REACHING INDUSTRY STANDARDS, AND AN UNPRECEDENTED DRIVE TO PREVENT JOB LOSSES IN THE OILFIELD SECTOR.



MARKET

ANALYSIS

ARTICLES

INTERVIEWS

VIEWPOINT

PROJECTS



PLUS



### Energy Outlook Report 2021

Founded on data from over 22,000 Energy industry employees, job seekers, recruiters and companies, the Energy Outlook Report 2021 identifies and illustrates the changes on the horizon and the ways in which companies are adapting to meet these challenges.

### Petroleum Biotechnology and its Applications

Expert in SQU have realized the potential future of biotechnology and how it can contribute specifically to petroleum industry in Oman in an environmentally-friendly manner to resolve challenges facing oil industries through continuous development of novel technologies.

### Seeh Al Sarya Engineering – Providing A To Z Services in the Oil and Gas Industry

Saif bin Said al Darai, Executive Director of SAS, discusses the company's achievements and plans as he continues to fulfil his vision of making SAS a lead contractor for oil and gas in the region.

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Few will look back on 2020 as anything but a calamitous year ravaged by the coronavirus pandemic and a protracted economic downturn. For OPAL, however, it was a stellar year, characterised by, among other things, new records in member subscriptions, the roll-out of far-reaching industry standards, and an unprecedented drive to prevent job losses in the oilfield sector
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# PETROLEUM BIOTECHNOLOGY AND ITS APPLICATIONS

Energy is a global demand which includes many forms – mainly petroleum, coal, natural gas, renewables and nuclear. The increase in demand for crude oil as a source of energy and as a primary raw material for industries has resulted in an increase in its production, transportation, and refining

**O**il and gas is Oman's largest energy industry in terms of revenue generation. The prosperous future of this industry depends upon advancement in the methods of exploration for new reserves and enhanced methods of production from existing fields, as well as a continuous supply of competently trained research professionals. The Oil and Gas Research Center (OGRC) at Sultan Qaboos University (SQU) was established in 2002 to achieve these goals in collaboration with different colleges and centers within SQU. The OGRC conducts research and provides training and consultancy services to the oil and gas industry, utilizing the excellent facilities available at SQU. Biotechnology is a fast-growing science in many applied fields to solve environmental, health and agricultural issues. With the development of artificial intelligence, biotechnology is becoming more established in manufacturing new biomaterials to improve employment and economy. In one of the recent European Annual Summits of the Global Future Councils, it was reported that the economy from biobase industry, referred as bioeconomy, is responsible for one third of the world's economy, unleashing a global revolution with the rapid advancement of the Fourth Industrial Revolution, contributing to



The bioproducts used for transporting oil in pipelines can also be used for sludge cleaning of oil storage tanks and for recover oil from oily sands instead of other existing chemical or thermal methods used to treat trapped oil. Those technologies cause loss of crude oil after treatment and therefore cannot be recovered to generate additional revenues. For more details on SQU-petroleum-biotechnology you can visit the site (<https://researches.squ.edu.om/meor/>).



**Prof Saif al Bahry,**  
*Director, Oil and Gas  
Research Center  
Sultan Qaboos  
University*

### **In-situ versus ex-situ technologies**

Unlike many researchers conducting in-situ research relevant to petroleum biotechnology, the SQU team have established a different innovative approach by producing microbial biosurfactants and biopolymers ex-situ.

The in-situ approach involves providing nutrients to the resident microbes to produce bioproducts to solve on site petroleum related issues.

On the other hand, the ex-situ is similar to chemical manufacturing surfactant and polymers, instead the microbes are used to produce these natural bioproducts externally faster and in high quantities when appropriate abiotic and biotic conditions are met. Unlike the environmentally friendly natural products produced by microbes, many synthetic chemical products used in oil industries have serious negative impacts on public health and natural habitats.

### **Bioproducts applied for petroleum biotechnology**

Five different biosurfactants and two biopolymers were identified and produced by local microbial isolates. Some of the bio-

more than a trillion US dollars per year.

### **Petroleum applied biotechnologies**

Expert in SQU have realized the potential future of biotechnology and how it can contribute specifically to petroleum industry in Oman in an environmentally-friendly manner to resolve challenges facing oil industries through continuous development of novel technologies.

More than eight different technologies in petroleum biotechnology were developed since this field of research was initiated in 2007. To mention some, these technologies include oil-spill bioremediation, mitigation of souring of oil-fields by sulfate reducing bacteria (SRB), transport of heavy oil through pipelines from field to the crude oil treatment plants and to the exporting facilities in Mina Al Fahal, Muscat.

## **“ FIVE DIFFERENT BIOSURFACTANTS AND TWO BIOPOLYMERS WERE IDENTIFIED AND PRODUCED BY LOCAL MICROBIAL ISOLATES ”**

surfactant are economically viable with high incremental oil recovery even after 20x dilutions.

In another study, using core-flood experiments under oil field conditions, biosurfactant and chemical surfactant were mixed at 1/1 ratio and incremental oil recovery was up to 50 per cent of oil in place. Two locally extracted biopolymers from microbes were also tested in core-flood experiments which recovered additional oil. All the tested biosurfactants and polymers remained stable after 6 months at different tempera-



**“ EXPERT IN SQU HAVE REALIZED THE POTENTIAL FUTURE OF BIOTECHNOLOGY AND HOW IT CAN CONTRIBUTE SPECIFICALLY TO PETROLEUM INDUSTRY IN OMAN IN AN ENVIRONMENTALLY-FRIENDLY MANNER TO RESOLVE CHALLENGES FACING OIL INDUSTRIES THROUGH CONTINUOUS DEVELOPMENT OF NOVEL TECHNOLOGIES**

ture, salinity and pH values, indicating their suitability for field applications. Alkaline: Biosurfactant: Biopolymers (ABsBp) combination has also been used to recover crude oil. Additional oil in place under laboratory conditions was recovered either by biosurfactant alone or in combination with alkaline, or ABsBp combinations.

**Environmental concerns relevant to oil industries**

Crude oil contains a complex mixture of compounds, mainly hydrocarbons and heavy metals which are both potent pollutants. The main environmental concern with crude oil is that, if not handled carefully, it may cause significant hazards to human health and the ecology system during all stages of production, processing and consumption.

Oil pollution occurs when crude oil is introduced into the environment directly or indirectly by man's activities resulting in an unfavorable change that may cause the life of living organisms to be endangered.

Several physical, chemical, biological techniques were developed to remove pollutants from environment by the process referred as remediation. Bioremediation is the use of microorganism metabolism to biodegrade or remove pollutants. The term bioremediation is often used in relation to

ecology and the natural environment and is now commonly associated with environmentally friendly products that are capable of decomposing back into natural elements. Hydrocarbon spills are a global overwhelming problem. It is very frequent in the Gulf of Oman and the Arabian Gulf. The major causes of oil pollution in the world include poor designs of ships and terminals, mechanical failure, operational procedures, oil transportation and corrosion of pipelines and tankers. Leakage and spilling of oil from natural deposits is one of the major ways that crude oil affects the environment. Crude oil spills or discharges into water systems will often eventually end up on land and may contaminate soil and/or sand.

Oil spills in marine habitats are due to the release of oil from offshore platforms crude oil from tankers. About 40 per cent of world's oil is produced in the Arabian Gulf which is transported internationally through Musandam strait and the Gulf of Oman. Due to the geographical position of Oman, the coastal lines are prone to oil spills. It was reported that the amount of tar ball deposition in the coastal lines reach 1 kg/m<sup>3</sup> which is an indication of how severe the oil spill is in this region and that Mina AI Fahal is the heaviest polluted area.

**Bioremediation of oil spills**

Bioremediation is efficient and cost viable, employed in polluted zones that are unreachable without excavation. If left unsolved it will contaminate groundwater and will impact public health and natural terrestrial and marine habitats. Bioremediation can occur on its own (natural attenuation or intrinsic bioremediation) or can be spurred on via the addition of fertilizers to increase the bioavailability within the medium and the matched microbe strains (biostimulation) to enhance the resident microbe population's ability to break down contaminants. Microorganisms used to perform the function of bioremediation are known as bioremediators.

**Conclusion**

Petroleum biotechnology encompasses many simple technologies which can assist various application dealing with crude oil utilization and assist oil industries to solve many challenges. Thus, SQU will continue to conduct research, provide services and train personnel who can solve challenging issues relevant to crude oil. New industries can emerge and established to open various opportunities for employment. ●