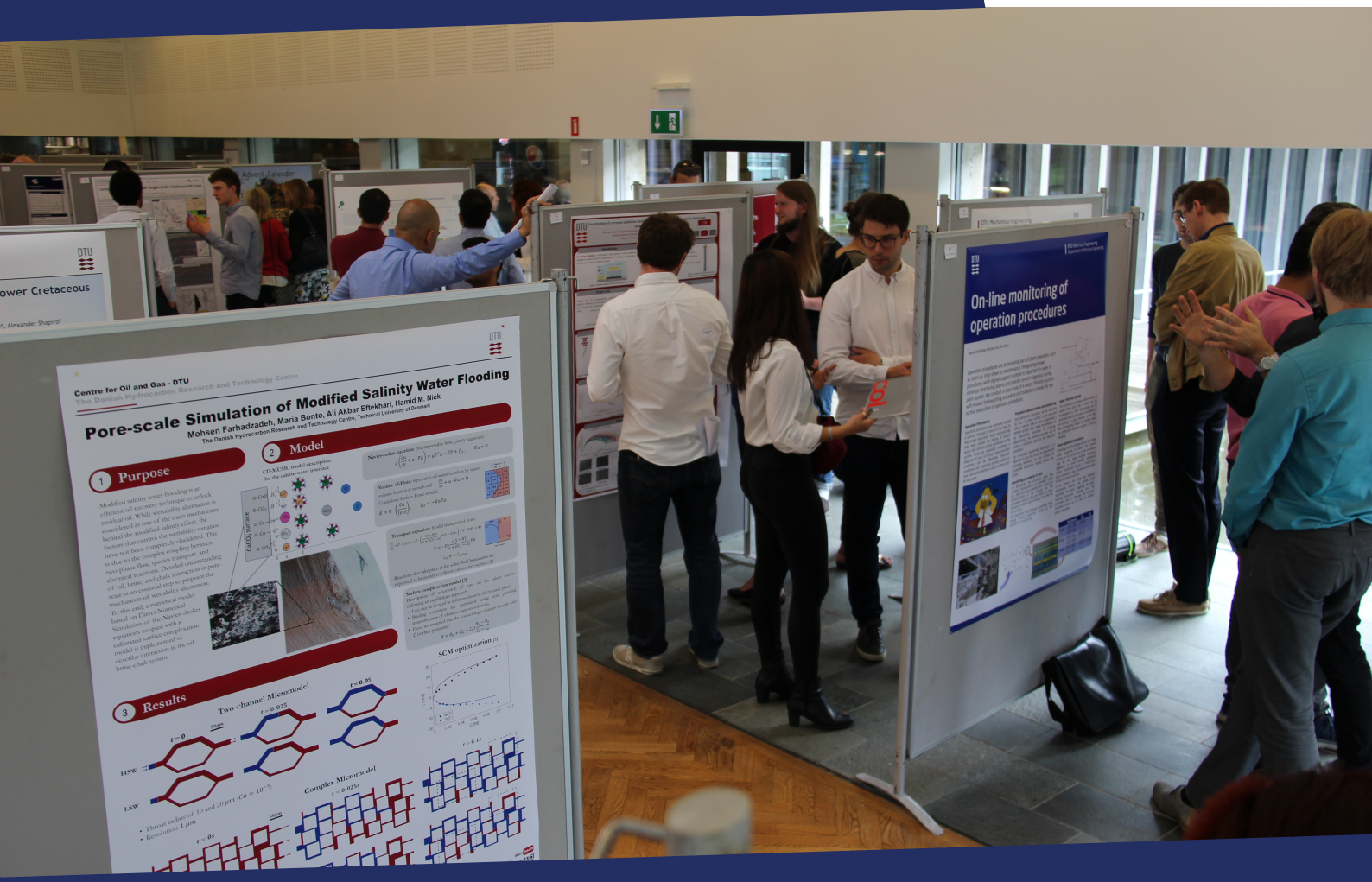
DTU Offshore
Danish Offshore Technology Centre

YOUNG RESEARCHER'S DAY 2022



Detailed Program

6 May 2022

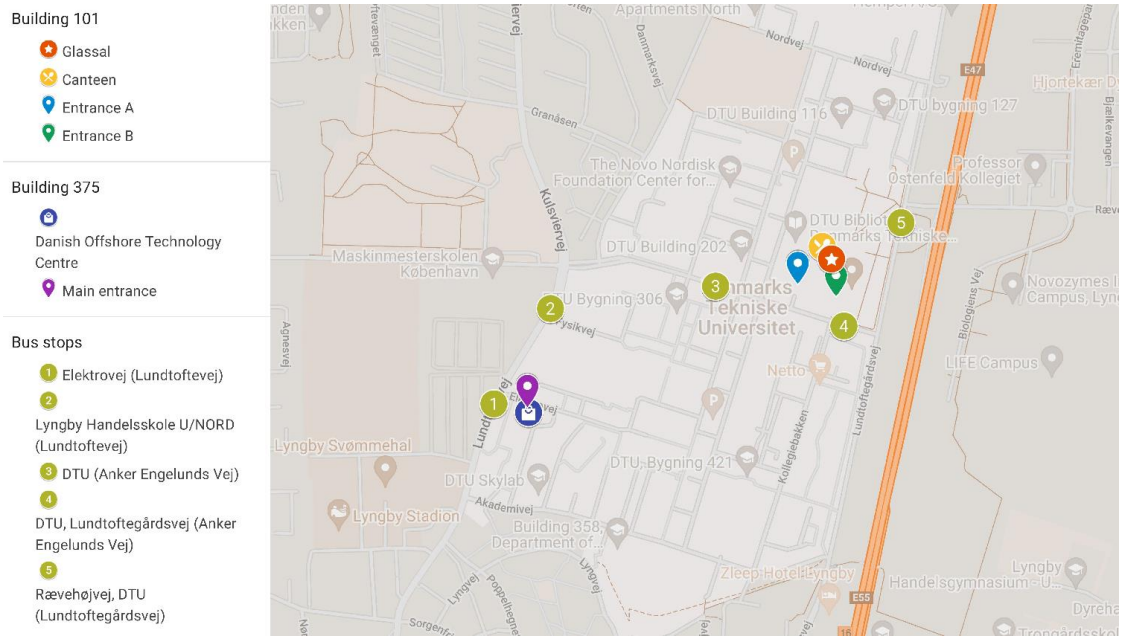
DTU Lyngby, Building 101A, Glassalen

AARHUS UNIVERSITY · UNIVERSITY OF COPENHAGEN · DTU · GEUS · AALBORG UNIVERSITY DENMARK

Summary

Practical Information

The Young Researcher's Day is a great opportunity to share your research with other young researchers and learn about their studies. Here you find practical information on the event. The main session will take place at the Glassal in DTU building 101, in the canteen area. The registration will open from 08:30. There you will receive your nametag and will be pointed to where you can attach your poster, if you have one, and that has not been done prior to the event. The afternoon/evening part of the event will take place in DTU Offshore (Elektrovej 375). This part of the event is exclusively for the presenters that have registered for dinner.



The Glassal is located in the North-East quadrant of DTU (building 101), and DTU Offshore is located in the South-West quadrant (building 375). Link to the map: https://bit.ly/3Jp9uzl.

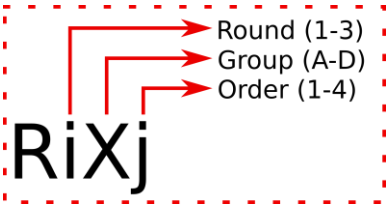
Schedule of the Event

Friday, 6 May 2022

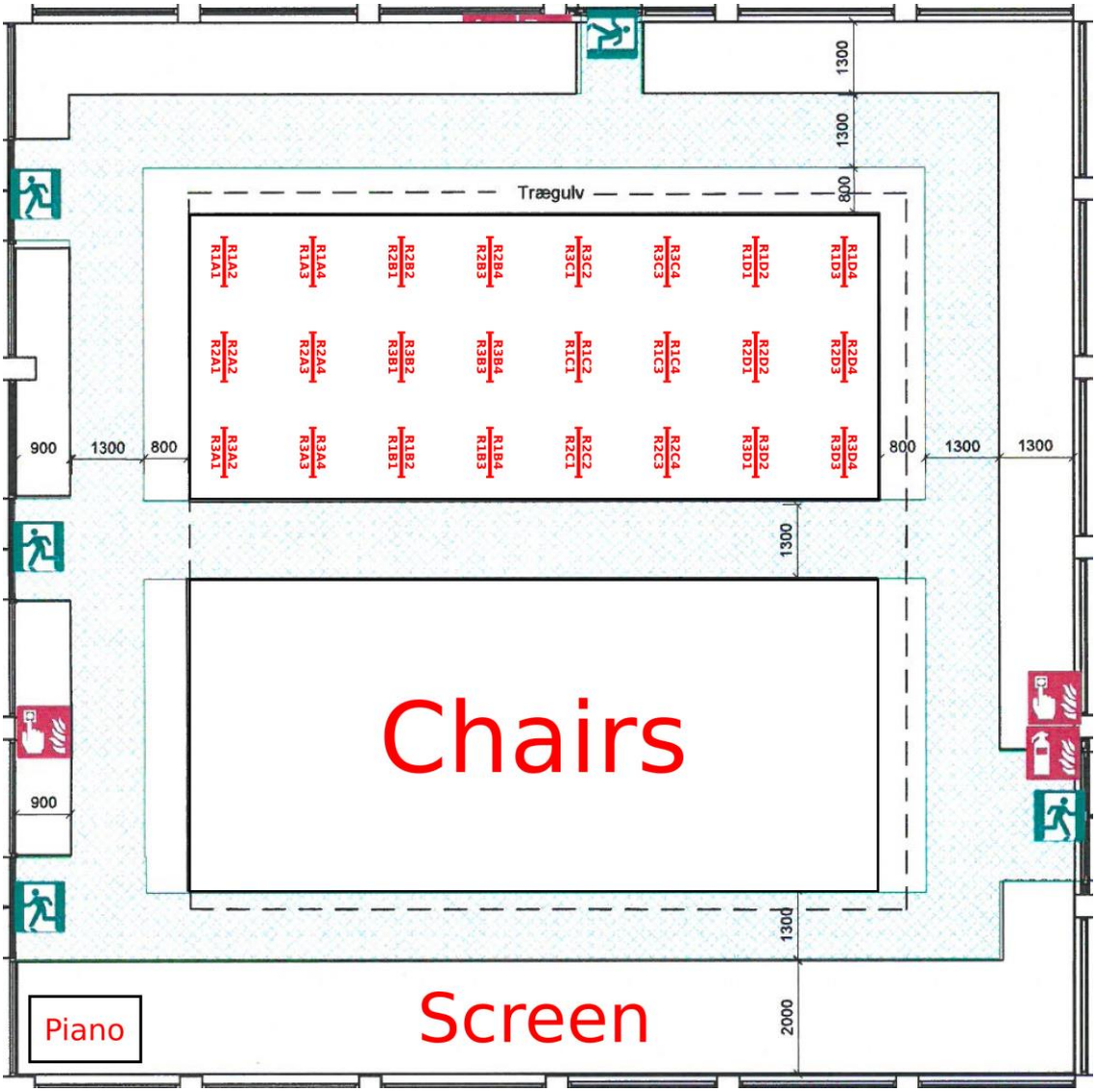
08:30 – 09:00	**Registration and icebreaker with coffee and tea**
09:00 – 09:15	**Welcome speech**
09:15 – 10:00	**Elevator pitches** (round 1)
10:00 – 10:45	**Poster session** (round 1)
10:45 – 11:30	**Elevator pitches** (round 2)
11:30 – 12:15	**Poster session** (round 2)
12:15 – 12:45	**Lunch**
12:45 – 13:30	**Elevator pitches** (round 3)
13:30 – 14:15	**Poster session** (round 3)
14:15 – 14:30	**Coffee break**
14:30 – 15:00	**Your role in turning research into innovation** Commercial team – DTU Offshore
15:00 – 15:15	**Best poster award and closing of scientific session**
15:15 – 15:30	**Meet and walk together to building 375** (presenters only)
15:30 – 17:30	**Team building** (presenters only)
17:30 – 21:00	**Drinks, dinner, and socializing** (presenters only)

Posters map

Code for the posters:



Glassal map:



Round 1 elevator pitches

09:15	**[A.1] Self-healing underground tank for CO_2 and controllable oriented healing caprock** Ming Li, DTU Offshore
	[A.2] Experimental Investigation of Gas Injection in a Tight Lower Cretaceous Oil Reservoir Rasoul Mokhtari, DTU Offshore
	[A.3] Compositional Simulation of Gas Injection in Tight Chalk Seyedamir Mirazimi, DTU Chemistry
	[A.4] Mapping Cretaceous faults using a convolutional neural network – A field example from the Danish North Sea Mads Lorentzen, GEUS
	[B.1] Facile fabrication of nanofiltration membranes for recovery of MEA-triazine Alaa Khalil, Aalborg University
	[B.2] Biomass based molecules for hydrogen sulfide scavenging Asger Koue, University of Copenhagen
	[B.3] Field scale reservoir microbial souring simulation Ali Mahmoodi, DTU Offshore
	[B.4] Reservoir souring, Aspirin or willow bark? Moein Jahanbani, DTU Offshore
	[C.1] Predicting the API of residual hydrocarbons Arka Rudra, Aarhus University
	[C.2] Fast evaluation of synergistic effects of combinations of production chemicals on oil-in-water droplet stability using microfluidics Liridon Aliti, DTU Offshore
	[C.3] Biological treatment for produced water at offshore platforms Ana Rita Ferreira, DTU Environment
	[C.4] Profiling of carboxylic acids in North Sea crude oils by halogenated secondary amine labeling and LC-HRMS Khoa Huynh, DTU Offshore

	[D.1] A modular approach to building polymer-based durable plugs Magdalena Skowyra, DTU Chemical Engineering
	[D.2] Sealing Abandoned Reservoirs Using Polymer Gels Lena Rigny, University of Burgundy
	[D.3] Molecular-Level Exploration of Fluid-Fluid and Fluid-Surface Interactions of Reservoir Fluids Sahar Hafizi, DTU Offshore
	[D.4] The importance of oil and gas platform foundations for a key commercial fish species, the Atlantic cod Bruno Ibanez Erquiaga, DTU Aqua

Round 2 elevator pitches

10:45	**[A.1] Numerical modeling of hydrogen-induced brittle fracture** Philip K. Kristensen, DTU Mechanical Engineering
	[A.2] Characterization of natural fractures in chalk using X-ray computed tomography; Examples from the Lower Cretaceous Valdemar Field (Danish North Sea) Aslaug Clemmensen Glad, DTU Offshore
	[A.3] Permeability of cracked oil well cement sheaths Abraham Ayache, DTU Civil Engineering
	[A.4] A midsurface extraction framework applied to computed tomography images for modelling fractured chalk samples Carlos Augusto Soares Ferreira, DTU Offshore
	[B.1] Thermodynamics of complex scale solutions Lucas Corrêa, DTU Chemical Engineering
	[B.2] Nanofilament Coatings Siad Ali, Aarhus University
	[B.3] On-Site Acid Production (OAP) Frederick Christensen, Aarhus university
	[B.4] In-situ scale investigation Isaac Appelquist, DTU Chemical Engineering

[C.1] Oil-Water Separation in the Presence of Production Chemicals
Khalil Kashefi, Aalborg University

[C.2] Inorganic characterization of produced water
Neri Bonciani, DTU Offshore

[C.3] Metal-Organic Frameworks based sensors for environmental monitoring
Jaskaran Singh Malhotra, DTU Offshore

[C.4] Evaluation of toxicity drivers in produced water
Matteo Ottaviani, DTU Offshore

[D.1] Remote sensing of Breaking Ocean Waves
Thomas Kabel, Aarhus University

[D.2] Nonlinear performance and damage detection of offshore structures
Luigi Caglio, DTU Civil Engineering

[D.3] Direct effect of wind on wave-induced loading on offshore platforms
Julie Kristoffersen, Aarhus University

Round 3 elevator pitches

12:45 **[A.1] Coupled field scale simulations of waterflooding in chalk reservoir**
Seyedbehzad Hosseinzadehsadati, DTU Offshore

[A.2] Pore-scale insights into two phase flow in chalk
Mohsen Farhadzadeh, DTU Offshore

[A.3] Revealing near well bore formation damage effects by core floods
Maksim Kurbasov, DTU Offshore

[A.4] Flow Potential of Diatomite formations
Marcus A. J. Gordon Thomas, DTU Offshore

[B.1] Augmentation of Sweet Corrosion Product for Erosion-Corrosion Mitigations
Dilshad Shaikhah, University of Leeds

[B.2] In-situ investigation of the development of the corrosion products/scale during CO_2 corrosion of low-alloy carbon steels using synchrotron X-ray diffraction
Saber Haratian, DTU Mechanical Engineering

[B.3] Effect of Cr as an alloying element on CO_2 corrosion resistance
Kapil Kumar Gupta, DTU Mechanical Engineering

[B.4] Movement of oil droplets against concentration gradient in thin capillary
Tian Wang, DTU Offshore

[C.1] Towards Environmentally Relevant Biodegradation Kinetics for Chemicals Emitted from Offshore Oil Platforms
Mette Møller, DTU Environment

[C.2] Advanced fluorescence-based sensor for monitoring oil in produced water
Isabelle Viegas, DTU Offshore

[C.3] Critical Review of the Risk Based Approach for Produced Water Discharges from Offshore Oil Production
Lars M. Skjolding, DTU Environment

[C.4] Hydrothermal oxidation of H_2S spent scavengers. Removing organic pollutants and reducing toxicity.
Nikolaos Montesantos, Aalborg University

[D.1] Improving efficiency through maintenance clustering
Julie Krogh Agergaard, DTU Mechanical Engineering

[D.2] Modularization in Maintenance – A New Paradigm
Kristoffer Sigsgaard, DTU Mechanical Engineering

[D.3] Structured performance evaluation of maintenance
Jingrui Ge, DTU Mechanical Engineering

[D.4] Configuration of Maintenance Activities
Kasper Barslund Hansen, DTU Mechanical Engineering

Round 1 short abstracts

Following the order of the elevator pitches

Title:	Self-healing underground tank for CO_2 and controllable oriented healing caprock
Presenter:	Ming Li, DTU Offshore
Abstract:	Carbon Capture and Storage (CCS) is mentioned as a promising way to mitigate climate

	change. One general challenge with storage CO_2 in subsurface reservoirs is the potential for leakage back to the atmospheric environment. In this work, we developed several smart polymers to set barriers between CO_2 and chalk.
Title:	Experimental Investigation of Gas Injection in a Tight Lower Cretaceous Oil Reservoir
Presenter:	Rasoul Mokhtari, DTU Offshore
Abstract:	As more marginal reservoirs such as tight Lower Cretaceous oil reservoirs in the Danish part of the North Sea are put into production, new information on enhanced production from very tight and micro-fractured carbonate material will be of great interest, while there is no reliable information in the literature on the efficiency of gas injection in such reservoirs. Therefore, this research by using real reservoir material, including real reservoir core plugs, and using re-combined live oil from the same reservoir, is aiming to provide gas injection experimental data not widely reported in the literature.
Title:	Compositional Simulation of Gas Injection in Tight Chalk
Presenter:	Seyedamir Mirazimi, DTU Chemical Engineering
Abstract:	Compositional simulation of gas injection involves some challenges, the most common of which are excessive vaporization of oil due to local equilibrium assumption, uncertainty of the measured absolute and relative permeability data, and change of gas-oil relative permeability curves in low interfacial tension conditions. In this study, proper techniques to overcome these issues are examined using the results of two natural gas flooding experiments performed on North Sea tight chalk samples at immiscible and near-miscible conditions.
Title:	Mapping Cretaceous faults using a convolutional neural network – A field example from the Danish North Sea
Presenter:	Mads Lorentzen, GEUS
Abstract:	Fault mapping provides essential information in many aspects of seismic exploration and reservoir characterization. However, manual interpretation of faults from seismic data can be challenging and time-consuming. We apply a CNN that was trained on synthetic seismic data to improve fault mapping in the Cretaceous section of the Valdemar Field. Comparison with standard fault attributes and a manual fault interpretation shows that the CNN predicts faults with more details that may improve the overall geological understanding of the study area.
Title:	Facile fabrication of nanofiltration membranes for recovery of MEA-triazine
Presenter:	Alaa Khalil, Aalborg University
Abstract:	This work presents the synthesis of thin-film composite (TFC) nanofiltration membranes for recovery of unspent triazine (HET) from spent/unspent H_2S scavengers (MEA, S,N-triazines, etc.) with high selectivity and permeability. TFC membranes fabricated by interfacial polymerization (IP) have been widely employed for wastewater treatment due to their desirable properties such as stability, ease of manufacturing, and high mechanical strength. The focus of the research was to study the influence of filtration layer thickness on membrane performance in terms of separation of HET from reaction products.

Title:	Biomass based molecules for hydrogen sulfide scavenging
Presenter:	Asger Koue, University of Copenhagen
Abstract:	A synthetic chemical approach in the attempt to develop a greener alternative to triazine based H_2S scavenges. These new H_2S scavenges are based on cheap, non-toxic, easily accessible biomass molecules. The biomass molecules are used as a starting material for synthetic modification into H_2S scavenges. The biomass based H_2S scavengers are being tested against triazine scavengers
Title:	Field scale reservoir microbial souring simulation
Presenter:	Ali Mahmoodi, DTU Offshore
Abstract:	Simulation of microbial generation of hydrogen sulfide, reservoir souring, and its mitigation in real-world field scale models gives us valuable insights on the ways to manage souring. In this work, rather unexpected results show us how souring is not only about how much hydrogen sulfide is generated but also about where in the reservoir it is generated and how it moves and reaches production wells. The results suggest that even an increased souring in the reservoir could result in reduced hydrogen sulfide production from production wells.
Title:	Reservoir souring, Aspirin or willow bark?
Presenter:	Moein Jahanbani, DTU Offshore
Abstract:	For years nitrate treatment has been used as a control measure to mitigate reservoir souring. Through an integrated experimental-modeling workflow we have found out the major souring inhibition mechanism of nitrate treatment is the intermediate production of nitrite. Upscaling of lab observations show that for efficient souring treatment, it is better to inject nitrite rather than nitrate.
Title:	Predicting the API of residual hydrocarbons
Presenter:	Arka Rudra, Aarhus University
Abstract:	Crude oils with different API ranges are aged under laboratory conditions and studied under a series of pyrolysis experiments. Ageing and evaporation cause loss of most labile hydrocarbons and increase in the high MW polar compounds and asphaltenes. When dealing with reservoir samples, proper storage and careful handling is important to achieve realistic geochemical and petrophysical calculations.
Title:	Fast evaluation of synergistic effects of combinations of production chemicals on oil-in-water droplet stability using microfluidics
Presenter:	Liridon Aliti, DTU Offshore
Abstract:	Produced water is well known to contain both dispersed and dissolved oil species. The ease of dispersed droplet removal is related to the droplet stability towards coalescence. The performance of many oil field chemicals is related to the surface activity of these and the ease of dispersing these species into the oil-water system being produced. In this work we report a number of microfluidic studies on how mixtures of chemicals affect coalescence frequencies and droplet behavior, and therefore eventually the performance of a produced water treatment system depending on oil-drop removal.

Title:	Biological treatment for produced water at offshore platforms
Presenter:	Ana Rita Ferreira, DTU Environment
Abstract:	This research work focuses on the biological treatment of produced water (PW) at oil and gas offshore platforms. Moving bed biofilm reactor (MBBR) has been studied aiming to reduce a large fraction of total organic carbon, and remove problematic chemicals and related PW toxicity before discharge to sea. MBBR performance was tested at two different temperatures (10°C and 40°C) to treat PW with distinct characteristics from offshore oil platforms. Operational parameters were also changed over the time such as hydraulic retention time, and salinity in order to biofilm resilience.
Title:	Profiling of carboxylic acids in North Sea crude oils by halogenated secondary amine labeling and LC-HRMS
Presenter:	Khoa Huynh, DTU Offshore
Abstract:	Molecules containing carboxyl functional groups play essential roles in petroleum geochemistry. However, the molecular composition of carboxylic acids (CAs) remains unidentified due to the crude oil matrix complexity, the low abundance and structural diversity of CAs. Here we developed a novel strategy of labeling in combination with HPLC-FT Orbitrap MS analysis for profiling of CAs in Danish North Sea crudes. The CAs were isolated by LLE and labeled by 4-bromo-N-methylbenzylamine (4-BNMA). The labeled molecules generate two characteristic product ions m/z 169 and 171, which were used to assign potential CAs. We successfully recognized 7 internal standards and discovered 50 candidates in original Danish crude. Overall, the method is demonstrated to be a promising strategy in the profiling of compounds with carboxyl groups.
Title:	A modular approach to building polymer-based durable plugs
Presenter:	Magdalena Skowyra, DTU Chemical Engineering
Abstract:	The oil well abandonment process involves a plugging step, which can be severely challenged by unconsolidated formations, high temperatures, and formation permeability. A new, greener solution to currently used techniques is proposed, consisting of a polymer-based plug that has low gas and water permeability, long-term durability, and the capability of autonomous setting when there is flow and rough surface. The plug is formed by the condensation of functionalized polymer microspheres through covalent bonds into a rigid solid that can permanently plug an oil well and withstand its extreme conditions for an extended period of time.
Title:	Sealing Abandoned Reservoirs Using Polymer Gels
Presenter:	Lena Rigny, University of Burgundy
Abstract:	The numbers of maturing offshore oil and gas fields in North Sea are only increasing as more and more brownfields are reaching towards an end of their economically productive life. One of the upcoming challenges is to maximize production from what remains and to safely, economically and optimally abandon the wells, which can no more produce. In the current research, polymer products have been prepared and evaluated towards their ability to seal the pores of the chalk. Tapping the development of these highly functional plugging materials may

	not only play a significant role towards the safe abandonment of offshore oil-and-gas fields but also towards storage of highly pressurized fluids and diverting/blocking the fluids flow under harsh environment as well.
Title:	Molecular-Level Exploration of Fluid-Fluid and Fluid-Surface Interactions of Reservoir Fluids
Presenter:	Sahar Hafizi, DTU Offshore
Abstract:	One of the major challenges for the physical sciences is to explore and accurately model how remarkable properties of macroscopic phenomena in the energy and materials sciences emerge from the interplay of crucial non-covalent intermolecular forces. These weak non-covalent forces are responsible for the thermodynamic properties of condensed bulk phases and the mechanical properties of functional materials. If we can isolate and spectroscopically characterize these smallest molecular building blocks accurately, molecule by molecule, we can provide important experimental observables required to validate and develop more accurate theoretical models of importance for real-world supra-molecular systems such as complex petroleum fluids, gas-oil mixtures and gas hydrates leak detection.
Title:	The importance of oil and gas platform foundations for a key commercial fish species, the Atlantic cod
Presenter:	Bruno Ibanez Erquiaga, DTU Aqua
Abstract:	Regulation calls for total removal of ageing oil/gas platforms through decommissioning. However, poor understanding of the mechanisms supporting platforms' effects remains, and so ecological scenarios from different decommissioning options. We provide an understanding of the role that platforms play for marine ecosystems in the Danish North Sea using cod as a case study to inform decision-making on decommissioning strategies by building on artificial reef ecology knowledge.

Round 2 short abstracts

Following the order of the elevator pitches

Title:	Numerical modeling of hydrogen-induced brittle fracture
Presenter:	Philip K. Kristensen, DTU Mechanical Engineering
Abstract:	Hydrogen embrittlement is a long-standing challenge in the design of offshore structures and components. The recently very popular phase field fracture model has proven highly suited both for fracture modelling in engineering components and for use in advanced models of hydrogen-assisted damage. This works seeks to further the development of the phase field fracture model towards capturing relevant physics within reasonable computation times.
Title:	Characterization of natural fractures in chalk using X-ray computed tomography; Examples from the Lower Cretaceous Valdemar Field (Danish North Sea)
Presenter:	Aslaug Clemmensen Glad, DTU Offshore

Abstract:	Natural fractures are important constituents of carbonate reservoirs, influencing connected porosity and permeability to promote, inhibit or prohibit fluid flow. A suite of representative frequent occurring natural fractures from the Lower Cretaceous Valdemar Field are imagined by CT scanner and their internal fracture network is mapped to enhance our understanding of their connectivity, geometry and potential form the basis for fluid flow simulations.
Title:	Permeability of cracked oil well cement sheaths
Presenter:	Abraham Ayache, DTU Civil Engineering
Abstract:	In oil wells, cement is pumped in to support and isolate the well from fluid migration. This zonal isolation assumes that cement is of low permeability. However, due to the extreme environment in the subsurface in which wells reside, the cement is put under immense stress, internally and externally. The cement can crack and create new pathways for formation fluids to escape and migrate. This research aimed at quantifying fluid flows within certain crack widths to understand how much leakage occurs per crack.
Title:	A midsurface extraction framework applied to computed tomography images for modelling fractured chalk samples
Presenter:	Carlos Augusto Soares Ferreira, DTU Offshore
Abstract:	This work explores the mathematical modelling of chalk samples by employing skeletonization techniques for generating mixed-dimensional models from CT images of core plugs. In addition, the full aperture distribution is scaled up using conditional generative adversarial networks. The goal is to provide high-fidelity computational models for multiphase flow and geomechanics simulations, while balancing accuracy and computational cost.
Title:	Thermodynamics of complex scale solutions
Presenter:	Lucas Corrêa, DTU Chemical Engineering
Abstract:	Mineral scaling is a critical problem in wells and in top-site facilities. The scale is typically very stable in terms of chemical and thermal properties, which makes it hard to remove once it was formed. Therefore, preventing solid deposition is more efficient than dealing with it after its deposition. The goal of this project is to enhance the accuracy and range of solubility calculation for scaling agents.
Title:	Nanofilament Coatings
Presenter:	Siad Ali, Aarhus University
Abstract:	Corrosion and scaling have tremendous impact on oil well health and maintenance intervals. Silica (SiO_2) based nanofilament (NF) coatings are self-cleaning and have high potential to protect well pipe surfaces. Within our recent projects we have performed lab optimization tests of the stability, concentration, deposition time, and solvent type related to various NF coating designs for their applicability under the harsh conditions expected in an oil well.
Title:	On-Site Acid Production (OAP)
Presenter:	Frederick Christensen, Aarhus university
Abstract:	As the motion towards a greener and more sustainable future has been set, there is a certain demand for zero pollution and green chemical technologies. Such a

	technology is the Bipolar Membrane Electrodialysis (BMED), which utilizes the unique feature of combined ion-exchange membranes for reducing the potential for water dissociation. My presentation will focus upon the BMED as a solution for both continuous in-line descaling and sour gas scrubbing.
Title:	In-situ scale investigation
Presenter:	Isaac Appelquist, DTU Chemical Engineering
Abstract:	Crystallisation fouling presents a costly challenge. Optimal maintenance requires accurate knowledge of the kinetics of the formation of crystallisation fouling. The most common ex-situ measurement techniques cannot accurately capture dynamic effects while current methods for comprehensive in situ investigations are limited. We use X-ray computed tomography (CT) scanning to address the challenge of dynamic effects in surface crystal growth. The high spatiotemporal resolution made it possible to gain new insights to the processes of crystal formation. Our findings show how the growth rate can vary 300% in the initial phases of growth. Our findings provide a foundation for unveiling the dynamics of fouling mechanisms, which will aid in developing more accurate prediction models.
Title:	Oil-Water Separation in the Presence of Production Chemicals
Presenter:	Khalil Kashefi, Aalborg University
Abstract:	Production chemicals are always part of the oil treatment operation units. The film forming corrosion inhibitors, soluble in water phase, are among these chemicals. This can hinder the water-oil separation process by formation of emulsion. In this study, gravity settling technique combined with droplet size measurements using microscope were used to investigate the separation process in model oil-brine system with different chemicals.
Title:	Inorganic characterization of produced water
Presenter:	Neri Bonciani, DTU Offshore
Abstract:	This study includes the initial characterization of Produced Water (PW) from a DUC oilfield, which is a remarkably heterogeneous and complex type of water sample. Total inorganic alkalinity (TA) of purified water samples, major ions and trace metals analyses has been carried out. SEM information on Suspended Particulate Matter (SPM) has also been accomplished.
Title:	Metal-Organic Frameworks based sensors for environmental monitoring
Presenter:	Jaskaran Singh Malhotra, DTU Offshore
Abstract:	The responsible abandonment of offshore oil & gas operations requires continuous monitoring of potential well leaks. Metal-organic frameworks (MOFs) are porous materials that can be tuned for selective sorption. This sorption upon conversion to a signal makes them suitable for sensing applications. Using a quartz crystal microbalance (QCM), we demonstrate gas-phase methane detection using thin films of the MOF – [Cu(hfipbb)(H_2O)]. Additionally, we show that the MOF can bind dissolved methane from aqueous phase. Thus, when optimized, we envision that this sensor shall be applicable for methane-leak detection at the seabed.
Title:	Evaluation of toxicity drivers in produced water

Presenter:	Matteo Ottaviani, DTU offshore
Abstract:	Produced water (PW) is the water co-produced with oil and gas from oil wells, it contains environmental concerning substance like Naphthenic acids (NAs) and Alkyl Phenols (APs). The aim of the study was to isolate and quantify fractions of APs and NAs from samples of produced water from the Danish oil production wells using solid phase extraction. The extracts were measured for target analysis with LC-ESI-MS and the total acidic content of the NAs fraction was determined by Fourier-transform infrared spectroscopy. The toxicity of the extracted fractions was assessed using metabolic activity of bioluminescent bacteria and growth inhibition of algae.
Title:	Remote sensing of Breaking Ocean Waves
Presenter:	Thomas Kabel, Aarhus University
Abstract:	Based on recent extreme waves in the North Sea, it is becoming increasingly clear that it is of vital importance to investigate an improved method of measuring waves. The present project utilizes the LIDAR technology, through a new equipment called "Wave Mapper". The technology enables the possibility of measuring a 3D-area, enabling the development of a unique database of full-scale breaking events.
Title:	Nonlinear performance and damage detection of offshore structures
Presenter:	Luigi Caglio, DTU Civil Engineering
Abstract:	A considerable amount of existing offshore platforms in the North Sea can be subjected to excessive wave loads, which may compromise their structural integrity. Typically, only a limited number of sensor measurements are available during such hazardous events in order to assess the state of the structure. Along these lines, this study focuses on the employment of a Kalman Filter/Finite Element-based damage detection scheme in order to estimate the structural damage occurred during an extreme event.
Title:	Direct effect of wind on wave-induced loading on offshore platforms
Presenter:	Julie Kristoffersen, Aarhus University
Abstract:	The design load from waves on offshore structures are often estimated by aid of experimental studies in wave flumes and basins. When going from open sea to laboratorial conditions the wind above waves is omitted. The question is if the wind field alter physical properties such as steepness of waves, the number of breaking waves and hereby the force. To investigate the matter, an experimental study was conducted. The introduction of wind consistently increased the number of breaking waves detected with a breaking criterion. The wave-induced load in the tail of the exceedance probability curve was only increased for some of the sea states, when wind was present. The maximum wave-induced pressure in the tail of the exceedance probability curve was on the contrary increased for all sea states.

Round 3 short abstracts

Following the order of the elevator pitches

Title:	Coupled field scale simulations of waterflooding in chalk reservoir
Presenter:	Seyedbehzad Hosseinzadehsad, DTU Offshore
Abstract:	My presentation addresses the impact of the coupled interactions on the fluid transport (e.g., production) due to the seawater and modified salinity water injection into the chalk reservoirs. To this end, a wrapper is developed in Matlab that captures the induced alteration of flow and petrophysical properties of chalk.
Title:	Pore-scale insights into two phase flow in chalk
Presenter:	Mohsen Farhadzadeh, DTU Offshore
Abstract:	Spontaneous imbibition is considered one of the most important mechanisms in fractured porous media, which can drive oil into the fracture by capillary forces. The potential increase of matrix-fracture mass transfer due to imbibition would be strongly impacted by wettability. In Modified salinity waterflooding, the wettability alters toward a more water-wet state by the inter-relation between flow, transport, and chemical reactions at the pore-scale. Therefore, a numerical model that includes two-phase flow, multi-component reactive transport, and wettability alteration is implemented to study the pore-level effect of wettability change on the co-current and counter-current imbibition for simple 2D micromodels.
Title:	Revealing near well bore formation damage effects by core floods
Presenter:	Maksim Kurbasov, DTU Offshore
Abstract:	This study proposes to investigate these effects with a new core flood and proposes to improve the treatment of formation water to provide an optimized formation water flood. The characterization of additives in real produced water samples will be carried out by chemical analysis in close collaboration with the ongoing analytical studies of the produced water program prior to planning large scale core flood experiments. A better understanding of the composition of slick deposits can lead to improved PWRI processes that can improve well performance and as well as disposal of produced water. This will also result in improved water treatment performance to reduce injectivity loss.
Title:	Flow Potential of Diatomite formations
Presenter:	Marcus A. J. Gordon Thomas, DTU Offshore
Abstract:	The diatomite formations in the North Sea basin form part of the overburden of the underlying oil fields. Inherently diatomite has a high porosity, but low permeability. Cracks and micro cracks can however cause the effective permeability of the diatomite formation to be enhanced. This project aims to model the flow potential in these diatomite formations to evaluate the risk of leakage in relation to plugging operation, to then optimize time and cost efficiency of such operations.
Title:	Augmentation of Sweet Corrosion Product for Erosion-Corrosion Mitigations
Presenter:	Dilshad Shaikhah, University of Leeds
Abstract:	Iron carbonate ($FeCO_3$) is a carbon dioxide (CO_2) corrosion by-product known to provide corrosion resistance to carbon steel in specific environmental conditions.

	Nonetheless, it suffers from both chemical dissolution and mechanical damage when the pH is low and when subjected to particle impingement, respectively. This work aims at understanding whether incorporating two amino acids, mainly cysteine and glycine help improve either the reduction in corrosion rate or the mechanical properties of $FeCO_3$.
Title:	In-situ investigation of the development of the corrosion products/scale during CO_2 corrosion of low-alloy carbon steels using synchrotron X-ray diffraction
Presenter:	Saber Haratian, DTU Mechanical Engineering
Abstract:	The complex chemical environment present in the production wells used in the oil and gas industries could highly influence the initiation, precipitation, and growth of the corrosion scales in their surface region as a consequence of CO_2-electrochemical reactions. The current contribution addresses the results obtained from the in-situ synchrotron X-ray diffraction combined with electrochemical measurements of low-grade steels in CO_2-saturated Ca^{2+} containing brine at moderately high temperatures. Furthermore, the characterization results of the CO_2-corrosion induced scales developed on the low-alloy carbon steels utilizing ex-situ high-resolution electron microscopy, depth-resolved grazing incidence synchrotron X-ray diffraction, and X-ray (micro-) tomography are thoroughly discussed.
Title:	Effect of Cr as an alloying element on CO_2 corrosion resistance
Presenter:	Kapil Kumar Gupta, DTU Mechanical Engineering
Abstract:	Generally speaking, the addition of Cr as a constituent alloying element in steels is known to improve their corrosion resistance but adding in high quantities increases the material's cost, making it unsuitable for low-yield fields. Thus, a particular quantity of Cr could be added to the low-alloy steel for enhancing its corrosion resistance and making it more cost-effective. The goal of this research was to understand the effect of Cr as an alloying element on CO_2 corrosion behavior and scaling of low-alloy steels. Conventional L80 steels with various content of Cr were electrochemically subjected to CO_2-saturated simulated formation water chemistry combined with DC polarization and AC impedance techniques to assess the steels' electrochemical and corrosion behavior followed by surface characterization using XRD, SEM.
Title:	Movement of oil droplets against concentration gradient in thin capillary
Presenter:	Tian Wang, DTU Offshore
Abstract:	We study the motion of micro oil droplets in thin capillaries by coupling a microfluidic droplet generator and a thin glass capillary. The forces that mobilize the droplets were analyzed. We demonstrate, for the first time, that the droplets can move in confined space against pressure in the presence of non-uniform electrolyte concentrations. The gradient-driven movement can be strong enough to drive a droplet through a narrow constriction in the middle of the capillary channel. The movement of oil droplets may be manipulated by adjusting the composition of the saline solutions and the injection pressure. The results may be applied in many areas, e.g. understanding the physical mechanisms for enhanced

	oil recovery and membrane filtration, design of drug delivery system and particle trapping in microfluidic devices.
Title:	Biodegradation kinetics of chemicals in produced water
Presenter:	Mette Møller, DTU Environment
Abstract:	Research is needed to bridge the knowledge gap between biodegradation kinetics predicted from standardized laboratory tests and the actual environmental biodegradation kinetics. This research aims to (1) improve the environmental relevance of biodegradation kinetic data and (2) investigate the effect of dilution of produced water in seawater on biodegradation kinetics. Produced water (emitted chemicals) is combined with seawater (native degrader microorganisms) at different dilution levels in a novel biodegradation test. During 60 days, biotic (seawater) and abiotic (ultrapure water) test systems will be analyzed by SPME coupled to GCMS to determine biodegradation kinetics. This poster will also be presented at the SETAC Annual Meeting in Copenhagen.
Title:	Advanced fluorescence-based sensor for monitoring oil in produced water
Presenter:	Isabelle Viegas, DTU Offshore
Abstract:	Fluorescence spectroscopy is a powerful candidate technique for online monitoring of oil in produced water. However, the conventional, single-wavelength sensors provide poor quantification for oil contents higher than 10 mg L-1, since they are unable to consider variations in the signal that are not proportional to oil concentrations. We propose then to use 3D-fluorescence landscapes and handle all sources of variation in the signal by tensorial analysis, providing a straightforward and robust methodology to determine crude oil content in water.
Title:	Critical Review of the Risk Based Approach for Produced Water Discharges from Offshore Oil Production
Presenter:	Lars M. Skjolding, DTU Environment
Abstract:	This poster presents the results of a literature review considering the regulatory adequacy of the data available in the scientific literature for use in the Risk Based Approach (RBA) for assessing environmental impact of produced water discharges from offshore oil production. Additionally, the poster highlights limitations to the current iteration of the RBA and propose recommendations to improve the RBA for a more transparent evaluation of the risk associated with the produced water discharge.
Title:	Hydrothermal oxidation of H_2S spent scavengers. Removing organic pollutants and reducing toxicity.
Presenter:	Nikolaos Montesantos, Aalborg University
Abstract:	The discharge to the sea of spent H_2S scavengers accounts for a considerable part of the total environmental impact factor of offshore oil and gas production. In this work, hydrothermal oxidation is utilized to convert the spent scavenger organic pollutants to CO_2, water and inorganic salts rendering it less harmful. The process is evaluated on real offshore samples, with respect to the destruction of the scavenging reaction products and the unreacted MEA-triazine as well as to the

	overall toxicity of the effluent in comparison to the feed spent scavengers.
Title:	Improving efficiency through maintenance clustering
Presenter:	Julie Krogh Agergaard, DTU Mechanical Engineering
Abstract:	Large, complex, continuous plants such as oil and gas platforms require maintenance to ensure safe and continuous production. However, maintenance supporting work and equipment shutdowns that are costly and affect the production. This project focuses on improving the decision-making foundation to help maintenance planners identify opportunities for clustering of maintenance actions.
Title:	Modularization in Maintenance – A New Paradigm
Presenter:	Kristoffer Sigsgaard, DTU Mechanical Engineering
Abstract:	how modularization principles from product modularization can be applied in maintenance and how they induce significant cost reduction while ensuring that the need for maintenance is met. Considering asset-intensive industries, the importance of maintenance is increasing and is a critical factor that enables cost-efficient and safe operation of an asset.
Title:	Structured performance evaluation of maintenance
Presenter:	Jingrui Ge, DTU Mechanical Engineering
Abstract:	Performance evaluation is a key element for the continuous improvement of offshore maintenance activities. In this project, an adaptable maintenance performance evaluation framework is proposed to structure performance measures throughout major processes of the maintenance flow, enabling the detection and reduction of non-value-adding elements in maintenance. The framework will provide a holistic view on maintenance process performance and support the decision-making process of maintenance management.
Title:	Configuration of Maintenance Activities
Presenter:	Kasper Barslund Hansen, DTU Mechanical Engineering
Abstract:	In preparation of maintenance for complex systems, often the selection of activities is time-consuming and sub-optimal in terms of overall operational costs, use of resources, and asset availability and reliability. This study examines the applicability of configuration approaches known from the product domain, to support the maintenance preparation. The aim is to handle dependencies between equipment, failures, procedures, and resources, and include advanced decision-making and estimation methods, to generate complete work instructions with accurate time estimations.