

9th International Conference on Porous Media
& Annual Meeting

May 8 - 11 2017

Rotterdam, The Netherlands

INTERPORE 2017 PROGRAM





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Iris Batterham, Conference Organizer

Phil Vardon, Co-chair

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Dear InterPore 2017 Participants,

On behalf of the International Society for Porous Media (InterPore) and the Local Organizing Committee, I would like to welcome you to the 9th International Conference on Porous Media and Annual Meeting (InterPore 2017) in Rotterdam.

The InterPore yearly events offer pleasant opportunities to meet new colleagues, old friends and collaborators, and most importantly to present your work and become acquainted with the latest state of the science and technology in this fascinating, important and fast growing field of applied sciences. InterPore has become one of the most important platforms for porous media researchers, engineers and theoreticians.



This year we have another outstanding meeting brewing with more than 950 abstract submissions and well over 700 registrants. The conference includes four plenary lectures and 16 invited presentations, covering a wide range of porous media applications. We have 400 oral features, over 150 poster pitches and more than 300 posters. The conference features four general sessions, one special session, 70 minisymposiums and seven short courses. This year we introduced the poster pitch presentations to give the opportunity to a wider number of participants to present their work. The conference is fully digital with central management of presentation files. This will ensure that the sessions run smoothly and without delays due to swapping of USBs' and/or laptops.

An important event is the Annual Meeting of the Society on May 8, during which the officials of InterPore report the status of the Society, membership developments and various other activities. All participants are welcome to attend this meeting, whether members or non-members. One of the highlights of the meeting is recognizing our colleagues who have received InterPore awards due to their outstanding contributions to porous media science and/or services to the porous media community. During the Annual Meeting, the InterPore-Fraunhofer Award for Young Researchers will be given to Iryna Zenyuk, and Proctor & Gamble Student Award for best poster presented at the InterPore2016 conference in Cincinnati will be given to Manuel Hirschberg and Kofi Osei-Bonsu. Also, a number of colleagues who have made extraordinary contributions to InterPore activities in the recent past will receive InterPore rosette. During the Gala Dinner, Bernard Schrefler and Marc Prat, recipients of the Honorary Lifetime Membership Award and the InterPore-Proctor & Gamble Award, respectively, will be honored.

Many institutions and companies have kindly offered their support to this event and participated as sponsors and exhibitors, and we would like to thank them for their valuable contributions. Our Platinum sponsors are Delft University of Technology, Fraunhofer ITWM, Kimberly-Clark Inc., Proctor and Gamble, Shell Global Solutions International BV, and Utrecht University. The Gold sponsor is ZEISS Microscopy and the Silver sponsor is Volume Graphics. Our regular sponsors are Begell House Publishers, IFP Energies Nouvelles, and Océ-Canon. Our exhibitors are Begell House Publishers, Bruker BioSpin, Bruker microCT, MaP-Microstructure and Pores, Math2Market, Phenom-World, Springer AG, Synopsys-Simpleware, Volume Graphics, XRE, ZEISS Microscopy, and the InterPore Jubilee Committee. They can all be found in the exhibition hall alongside the posters.

We are sincerely grateful to the Program Committee and the Chairs of the sessions for their contributions to the conference. The unlimited support of Majid Hassanizadeh, Managing Director of InterPore, without whom this conference series would not continue to be the success it is, is highly appreciated. Many thanks go to our partners in organizing this important event. We are thankful to the TU Delft Conference Organizer, Iris Batterham, Rotterdam Partners, De Doelen staff, the catering companies: Van der Linde Catering and Arjan van Dijk Catering, and our volunteer assistants for their tremendous efforts to organize this conference. We highly acknowledge the faculty of Civil Engineering and Geosciences of Delft University of Technology for its limitless support in organising the 2017 edition of the InterPore conference. Thank you all for joining us in Rotterdam and we hope that this conference will be useful and enjoyable for you.



Rafid Al-Khoury

On behalf of the InterPore Executive Committee and Local Organizing Committee

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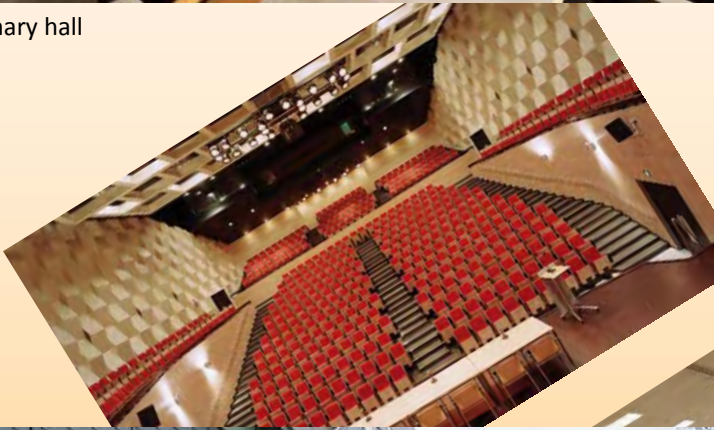
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MAP
Microstructure and Pores





Plenary hall



De Doelen




8 MAY 2017

Day
1

Program


Parallel Session: Session for Oral feature presentation (18 minutes (15 + 3))
 Poster Pitch Presentation Session: Session for oral pitch presentation (3 minutes (2 + 1))
 Poster Session: Poster board presentation

Opening										12:30 -12:40									
Plenary Speaker		12:40 - 13:20 Plenary hall All are welcome				Jiun-Shyan (JS) Chen University of California San Diego													
Parallel Session-1		13:30 - 15:00		Room 1 GS1		Room 2 GS2		Room 3 MS4.5		Room 4 MS4.11		Room 5 MS3.3		Room 6 MS4.8		Room 7 MD1		Room 8	
Coffee										15:00-15:30									
Break																			
Parallel Session-2		15:30 - 17:00		Room 1 MS1.1		Room 2 MS1.8		Room 3 MS1.15		Room 4 MS2.4		Room 5 MS2.12		Room 6 MS2.19		Room 7 MS3.4		Room 8	
Coffee										17:00 - 17:30									
Break																			
Annual Meeting		17:30 - 18:45		Plenary hall All are welcome															
Ice Breaker										19:00 - 20:30									
										De Doelen									







9 MAY 2017

Day
2

Program

Plenary Speaker	8:30 - 9:10 Plenary hall	 <p>Ellen Kuhl Stanford University</p>							
Parallel Session-1	9:20 - 10:50	Room 1 GS3	Room 2 GS4	Room 3 MS1.14	Room 4 MS2.3	Room 5 MS2.13	Room 6 MS2.18	Room 7 MD2	Room 8
Coffee Break	10:50-11:20								
Parallel Session-2	11:20 - 12:50	Room 1 MS1.2	Room 2 MS1.10	Room 3 MS1.16	Room 4 MS2.3	Room 5 MS2.21	Room 6 MS2.18	Room 7 MS3.7	Room 8 MS4.1
Lunch	12:50 - 14:00								

9 MAY 2017

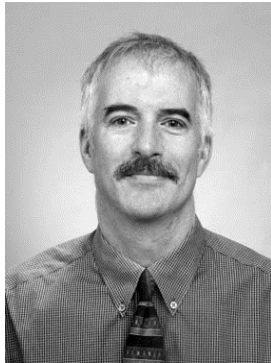
Program									
Invited Speakers	14:00 - 14:30	Room 1 Kurosch Rezwan 	Room 2 Kent-Andre Mardal 	Room 3 Andrea Schnepf 	Room 4 Jonas Toelke 	Room 5 Noushine Shahidzadeh 	Room 6 Derek Elsworth 	Room 7	Room 8
Poster Pitch Presentation Session	14:40 - 15:40	Room 1 Bruker BioSpin GS1 [MS1.1+ MS1.7+ MS1.8+ MS1.12+ MS1.15]	Room 2 Synopsis - Simpleware GS1 [MS1.3+ MS1.11+ MS1.13+ MS1.14]	Room 3 Volume Graphics GS2 [MS2.3+ MS2.4+MS2.6+ MS2.12+MS2.17+ MS2.18+MS2.19+ MS2.21+MS2.27] GS3 [MS3.2+ MS3.3+MS3.4+ MS3.6]	Room 4 MaP- Microstr. & Pores GS4 [MS4.1+ MS4.2+ MS4.3+ MS4.5+ MS4.8+ MS4.11]	Room 5	Room 6	Room 7	Room 8
Scheduled Poster Session, Exhibition and Coffee Break	15:45 - 16:45	Authors will be present by their posters during this session. Posters will be available throughout the conference on Days 2-4.							
Parallel Session-3	16:45 -18:15	Room 1 MS1.3	Room 2 MS1.1	Room 3 MS2.5	Room 4 MS2.17	Room 5 MS2.21	Room 6 MS3.1	Room 7 MS4.2	Room 8
Gala Dinner	19:00 - 23:00	Laurens Church Cultural Heritage							

10 MAY 2017

Day

3







Program

Plenary Speaker	8:30 - 9:10 Plenary hall	 <p>Robert Zimmerman Imperial College London</p>							
Parallel Session-1	9:20 - 10:50	Room 1 GS1	Room 2 MS1.3	Room 3 MS2.27	Room 4 MS3.1	Room 5 MS4.15	Room 6 MS4.10	Room 7 MD3	Room 8
Coffee Break	10:50-11:20								
Parallel Session-2	11:20 - 12:50	Room 1 MS1.3	Room 2 MS1.10	Room 3 MS2.6	Room 4 MS2.17	Room 5 MS2.22	Room 6 MS4.10	Room 7 MS2.29	Room 8
Lunch	12:50 - 14:00								

10 MAY 2017

Day
3


Program

Invited Speakers	14:00 - 14:30	Room 1 Insa Neuweiler 	Room 2 Natalie Schroeder 	Room 3 Wolfgang Ehlers 	Room 4 Michel Louge 	Room 5 Masoud Jabbari 	Room 6 Bernhard Schrefler 	Room 7	Room 8
Poster Pitch Presentation Session	14:40 - 15:40	Room 1 Phenom-World GS1 [MS1.2+ MS1.4+ MS1.5+ MS1.6+ MS1.10+ MS1.16]	Room 2 Bruker microCT GS2 [MS2.7+ MS2.8+ MS2.22+ MS2.23+ MS2.25+ MS2.27+ MS2.29]	Room 3 Springer GS4 [MS4.6+ MS4.7+ M4.9+ MS4.12+ MS4.13]	Room 4 Math2Market GS4 [MS4.4+ MS4.10+ MS4.14+ MS4.15]	Room 5	Room 6	Room 7	Room 8
Scheduled Poster Session, Exhibition and Coffee Break	15:45 - 16:45	Authors will be present by their posters during this session. Posters will be available throughout the conference on Days 2-4.							
Parallel Session-3	16:45 - 18:15	Room 1 SS1	Room 2 MS2.28	Room 3 MS2.7	Room 4 MS2.17	Room 5 MS2.22	Room 6 MS1.4	Room 7 MS4.14	Room 8
Student Event									

11 MAY 2017

Day
4





Program

Plenary Speaker	8:30 - 9:10 Plenary hall	 <p>Amir Faghri University of Connecticut</p>							
		Room 1 GS3	Room 2 GS4	Room 3 MS1.3	Room 4 MS1.5	Room 5 MS1.6	Room 6 MS2.8	Room 7 MS2.23	Room 8 MS2.25
Parallel Session-1	9:20 - 10:50								
Coffee Break	10:50-11:20								
Parallel Session-2	11:20 - 12:50	Room 1 MS2.28	Room 2 MS4.12	Room 3 MS1.3	Room 4 MS1.5	Room 5 MS1.6	Room 6 MS3.5	Room 7 MS2.14	Room 8 MS2.26
Lunch	12:50 - 14:00								

11 MAY 2017

Day
4

Program

Invited Speakers	14:00 - 14:30	Room 1 Iryna Zenyuk 	Room 2 Thomas Nagel 	Room 3 Nasser Khalili 	Room 4 Jeffrey Gostick 	Room 5	Room 6	Room 7	Room 8
Poster Pitch Presentation Session	14:40 - 15:40	Room 1 XRE GS2 [MS2.10+ MS2.11+ MS2.14+ MS2.20+ MS2.26]	Room 2 ZEISS Microscopy GS2 [MS2.1+ MS2.2+ MS2.9+ MS2.16+ MS2.28+ MS2.30]	Room 3 GS3 [MS3.1+ MS3.5+ MS3.7]	Room 4	Room 5	Room 6	Room 7	Room 8
Scheduled Poster Session, Exhibition and Coffee Break	15:45 - 16:45	Authors will be present by their posters during this session. Posters will be available throughout the conference on Days 2-4.							
Parallel Session-3	16:45 -18:15	Room 1 MS2.28	Room 2 MS1.5	Room 3 MS1.7	Room 4 MS2.11	Room 5 MS2.14	Room 6 MS2.10	Room 7 MS4.12	Room 8
Closing									

Jiun-Shyan (JS) Chen

University of California San Diego



Multiscale meshfree-based damage analysis for porous materials under extreme conditions

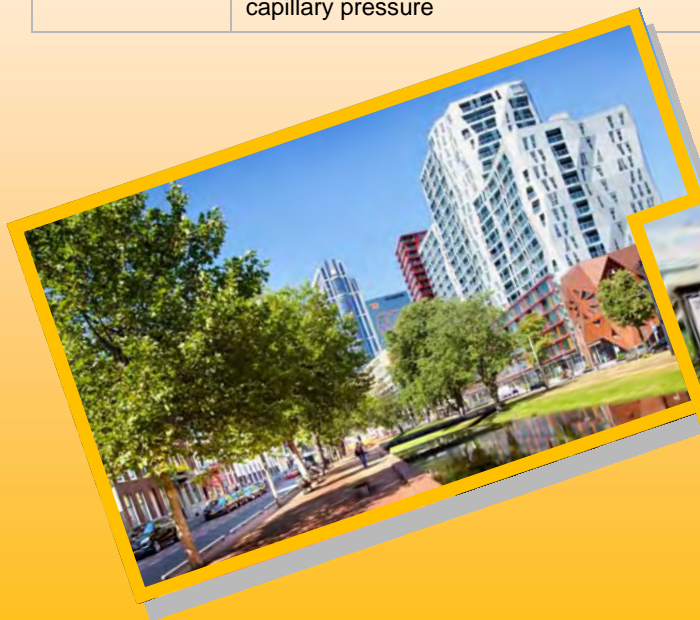
The failure processes in the porous materials exhibit distinct characteristics depending on the material porosity, the loading rate, and the environmental conditions. This work first discusses a damage models formulated by the homogenization of fracture models based on energy bridging. Meshfree methods such as the Reproducing Kernel Particle Method (RKPM) are well suited for modeling materials and solids undergoing fracture and damage processes. The challenges in the numerical approximation and discretization of failure modeling based on fracture mechanics and damage mechanics will then be addressed. The mesh dependent issues in the micro-crack informed damage model remedied by the implicit gradient regularization or scaling laws under the nonlinear Reproducing Kernel Particle Method (RKPM) framework will be discussed, and formulation for stability and convergence of the proposed numerical methods will be introduced. The fracture processes in porous microstructures modeled using stabilized and regularized RKPM, and the corresponding damage models extracted from multiscale modeling will be presented. The effects of reinforcement on the damage mechanisms in the materials will also be identified. Finally, the numerical simulations of concrete materials and structures subjected to extreme loadings will be demonstrated.

DAY 1 - 8 MAY

Session program

12:30-12:40	Opening: Plenary Hall Chair: John Cushman— Interpore President
12:40-13:20	Plenary speaker: Plenary Hall Jiun-Shyan Chen - University of California San Diego <i>Multiscale meshfree-based damage analysis for porous materials under extreme conditions</i> Chair: Majid Hassanizadeh
Parallel session-1	
13:30 - 15:00	Parallel session-1: Room 1 GS1: Fundamental theories of porous media Chairs: Steffen Berg, Michel Quintard
13:30	Session opening
13:32	Hasan Nooruddin: Impact of Invasion Percolation on Upscaling in Capillary-Controlled Darcy-scale Flow
13:50	Pascale Royer: Advection-diffusion in porous media at low scale separation via higher-order homogenization
14:08	Branko Bijeljic: On the Use of Distribution Functions to Determine Signatures of Flow, Transport and Reactive Processes
14:26	Stefan Luding: Fluid-solid interactions for atoms and particles
14:44	Yohan Davit: A domain decomposition approach to volume averaging with application to non-Fickian transport
13:30 - 15:00	Parallel session-1: Room 2 GS2: Computational challenges in porous media simulation Chairs: Inga Berre, Sorin Pop
13:30	Session opening
13:32	Karsten Thompson: A new algorithm for unstructured tetrahedral meshing of pore-scale digital images
13:50	Katja K. Hanowski: Coupling deformation and flow in fractured poroelastic media: Modelling, analysis and simulation
14:08	Aronne Dell'Oca: Space-time grid adaptation for solute transport in heterogeneous porous media
14:26	Wei Xing: Field emulators for a finite element porous media flow field simulator
14:44	Yu Chen: Development of a portable lattice Boltzmann code for direct numerical simulations of multiphase flow in porous media and microfluidic devices
13:30 - 15:00	Parallel session-1: Room 3 MS4.5: Microbial Life in Porous Media: from the micro-hydrodynamic to the continuous scale Chairs: P. de Anna, H. Auradou, E. Dressaire and G. Mino
13:30	Session opening
13:32	Anne E. Larue: X-ray microtomography imaging of biofilms in porous media
13:50	Albert C. Brangarí: A new mechanistic model to predict the impact of biofilms on porous media hydraulic properties
14:08	Herve Tabuteau: The impact of flow on microbial evolution in porous environments
14:26	Adama Creppy: Bacterial dispersion in porous media
14:44	Gaston L. Mino: Bacterial accumulation behind a grain

13:30 - 15:00	Parallel session-1: Room 4 MS4.11: <i>Drying of porous media and associated internal transport phenomena</i> Chairs: P. Coussot, N. Shokri and M. Prat
13:30 13:32 13:50 14:08 14:26 14:44	Session opening Amin Safi: Pore-level modelling of flow and mass transfer during evaporation in porous gas diffusion layers of polymer electrolyte fuel cells (PEFC) Emmanuel Keita: Control of drying with suspensions in porous media Hannelore Derluyn: Drying-induced salt crystallization dynamics in sandstone: a pore-scale study by 4D laboratory X-ray micro-CT Marc Prat: Granular medium surface heave due to internal sodium chloride crystallization induced by evaporation Marie Goavec: MRI of bitumen emulsion drying in porous medium
13:30 - 15:00	Parallel session-1: Room 5 MS3.3: <i>Characterization of Interfacial Interactions in Porous Media</i> Chairs: M. Ruecker, A. Georgiadis and P. Luckham
13:30 13:32 13:50 14:08 14:26 14:44	Session opening Lisa Joss: 3D gas sorption studies for in-situ measurement of sub-micron porosity of rocks Naveen Kumar: Study of surfactant loss at rock-liquid interface in enhanced oil recovery Alex Kirichek: Characterization of a CO ₂ -saturated porous rock using electrical impedance spectroscopy Xuhui Zhou: Electro-kinetic control of wettability in a micro-fluidic channel Patrick Huber: Capillary rise dynamics of liquid hydrocarbons in mesoporous silica as explored by gravimetry, optical and neutron imaging: Nano-rheology and determination of pore size distributions from the shape of imbibition fronts
13:30 - 15:00	Parallel session-1: Room 6 MS4.8: <i>Non-Newtonian fluids in permeable media: rheology, modeling, and applications</i> Chairs: Y. Meheust, C. Roquest, V. Di Federico and L. Zhong
13:30 13:32 13:50 14:08 14:26 14:44	Session opening Philippe Coussot: Non-linearities in yield stress fluid flows through porous media Laurent Talon: On the determination of a generalized Darcy equation for yield stress fluid in porous media Vittorio Di Federico: Porous gravity currents of non-Newtonian power-law fluids: a review of theoretical and experimental results John Ejezie: Flow behaviour of partially hydrolysed polyacrylamide polymers in granular soils Konrad Steiner: Modeling and Simulation of polyurethane foam injection moulding to produce fiber reinforced sandwich structures
13:30 - 15:00	Parallel session-1: Room 7 MD1: Multi-disciplinary Chairs: Jan Carmeliet; Patrick Kurzeja
13:30 13:32 13:50 14:08 14:26 14:44	Session opening Oleg Iliev: Different scaling regimes for modeling and simulation of reactive transport in 3D porous media Ali Zidane: Efficient Two-phase Compositional Flow Simulations in 2D and 3D Unstructured Gridding Gianluca Boccardo: Flow and transport in a 2D wavy channel of randomly varying aperture Stefan Karpinski: An interior penalty discontinuous Galerkin scheme for two phase flow in heterogenous porous media with discontinuous dynamic capillary pressure effects Patrick Kurzeja: Requirements for an REV identified by the concept of sufficiency using the example of capillary pressure

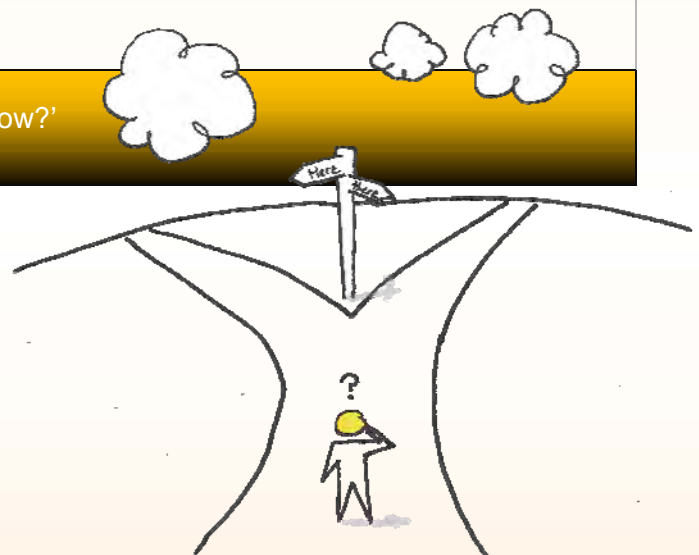


Rotterdam city life

Parallel session-2

15:30 - 17:00	<p>Parallel session-2: Room 1</p> <p>MS1.1: <i>Advances in the application of periodic and stochastic homogenisation to transport models and multi-physics simulation in porous media</i></p> <p>Chairs: M. Icardi, A. Mikeli, N. Ray, M. Schmuck, F. Theil, T. Kuusi and S. Armstrong</p>
15:30 15:32 15:50 16:08 16:26 16:44	<p>Session opening</p> <p>Sergiy Nesenenko: Stochastic homogenization of rate-dependent systems in plasticity theory</p> <p>Roberto Mauri: Flow through porous media: a momentum tracer approach</p> <p>Burt Tilley: On permeability dynamics in carbonaceous aquifers used in energy storage applications</p> <p>Donald Brown: A hierarchical finite element Monte Carlo method for stochastic two-scale elliptic equations</p> <p>Tobias Geback: A pore scale model for osmotic flow: homogenization and lattice Boltzmann simulations</p>
15:30 - 17:00	<p>Parallel session-2: Room 2</p> <p>MS1.8: <i>Continuum models for multiphase transport in porous media: the challenge of scale and REV concept</i></p> <p>Chairs: P. Kurzeja S.M. Hassanizadeh and J. Bear</p>
15:30 15:32 15:50 16:08 16:26 16:44	<p>Session opening</p> <p>Hamidreza Salimi: Comparison of percolation theory to pore-network theory for relative permeabilities and capillary pressures</p> <p>Maryam Baniasadi: Investigating multiphase flow behavior in trickle bed reactors using eXtended Discrete Element Method (XDEM)</p> <p>Yaoming Mu: Representative elementary volume for capillary dominated two-phase flow in porous media</p> <p>Ralf Jänicke: Computational Homogenization of seismic attenuation in fractured rock</p> <p>Amir Hossein Tavangarrad: Continuum scale modeling of drainage process of thin hydrophilic fibrous layer</p>
15:30 - 17:00	<p>Parallel session-2: Room 3</p> <p>MS1.15: <i>Transport in Fractures, Geomechanical/Geochemical Evolution and Geophysical Monitoring</i></p> <p>Chairs: L. Pyrak-Nolte and R. Zimmerman</p>
15:30 15:32 15:50 16:08 16:26 16:44	<p>Session opening</p> <p>Anthony Ladd: Simulations of fracture dissolution in three dimensions</p> <p>Tanguy Le Borgne: Solute transport, flow connectivity and biofilm growth in fractured media: field observations from multiscale tracer tests, geophysical imaging and genomic sequencing</p> <p>Holger Steeb: Effective coarse-grained properties of fluid-filled fractures</p> <p>Yue Hao: Numerical evaluation of multiphase flow processes and their effects on hydrocarbon production in hydraulically fractured reservoirs</p> <p>Robin Thomas: Change in three-dimensional rock mass permeability during the growth of geomechanical fractures</p>
15:30 - 17:00	<p>Parallel session-2: Room 4</p> <p>MS2.4: <i>Non-Linear Flow and Transport Processes in Porous Media</i></p> <p>Chairs: J. Moortgat, M.R. Soltanian, A. Raof and D. Bolster</p>
15:30 15:32 15:50 16:08 16:26 16:44	<p>Session opening</p> <p>Laurence Rongy: Influence of chemical reactions on the convective dissolution of carbon dioxide in porous media</p> <p>Marwan Fahs: Efficient and accurate numerical model for density driven flow in unsaturated porous media</p> <p>Jiajun Cen: Finite-element model to simulate buoyancy driven mixing in porous media</p> <p>Filip Dutka: Experimental and numerical investigation of the shapes of spontaneously emerging dissolution structures in porous rock</p> <p>Yangyang Qiao: Improved modeling of gravity aided spontaneous imbibition using momentum-equation based relative permeabilities</p>
15:30 - 17:00	<p>Parallel session-2: Room 5</p> <p>MS2.12: <i>Upscaling in digital rocks</i></p> <p>Chairs: J. Toelke</p>
15:30 15:32 15:50 16:08 16:26	<p>Session opening</p> <p>Lukas Keller: Multi-scale imaging of shales: Impact of sand on permeability and porosity</p> <p>Lukas Mosser: 3D reconstruction of porous media using generative adversarial neural networks</p> <p>Tong Liu: Critical size of REV and resolution of digital rocks for unconventional resources</p> <p>Jonas Toelke: Scale Coupled Upscaling of Multiphase Flow in Digital Core Analysis</p>

15:30 - 17:00	Parallel session-2: Room 6 MS2.19: Lattice Boltzmann Methods for modelling coupled processes in Porous media Chairs: R. Patel, I. Ginzburg, N. Prasianakis, G. Silva and J. Perko
15:30 15:32 15:50 16:08 16:26 16:44	Session opening Nikolaos Prasianakis: Reactive transport modelling of pore-size dependent mineral dissolution and precipitation Jiayi Chen: Implementation of cement paste pore system to simulate autogenous self-healing with Lattice Boltzmann method Adelchi Asta: Lattice Boltzmann method Lei Zhao: Simulation of shale-proppant-fluid interaction in hydraulic fracturing by coupled LBM-IBM-DEM scheme Ravi Patel: A lattice Boltzmann Method based tool for multiscale/multiphysics simulations
15:30 - 17:00	Parallel session-2: Room 7 MS3.4: Paper – fluids interactions Chairs: N. Tomozeiu and H. Aslannejad
15:30 15:32 15:50 16:08 16:26 16:44	Session opening Richard Dodge: Body fluid absorption at the component level and implications on composite performance Thijs van Stiphout: Liquid absorption in porous media studied by automatic scanning absorptometer Karin Zojer: Cement particle transport through sack paper Hamed Aslannejad: Pore scale study of hydraulic properties of uncoated paper Nicolae Tomozeiu: The essentials of the water based ink - paper interactions
17:00	Plenary hall Student Career Event 'What path to follow?' Willem-Bart Bartels, Maja Rucker



Ice breaker reception

All welcome

De Doelen

Willem Burger Foyer

Drinks & Bites

at 19:00 hr.



Ellen Kuhl

Stanford University



The poroelastic behavior of the human brain

Our brain is one of the most fascinating—but undoubtedly also most complex—structures within our body. During trauma, stroke, or infection, an abnormal accumulation of fluid causes the brain to swell. Within the limited space of the skull, brain swelling increases the intracranial pressure and reduces the supply of blood and oxygen. This can have devastating consequences. Several theories and models have been proposed to explain brain swelling; yet, it remains controversial whether the brain should be viewed as a viscous fluid, an gel-like solid, or a multiphase material. Here we review existing concepts and classify their usefulness in various clinical conditions. We provide experimental evidence that human brain tissue possesses multiple intrinsic time scales, which suggests that it acts like as an ultrasoft, multiphase material with distinct fluid and solid characteristics. In a clinical setting, to relieve an elevated intracranial pressure, neurosurgeons remove part of the skull and allow the swollen brain to bulge outward. This procedure is known as decompressive craniectomy and has been performed for more than a century; however, its effects on the swollen brain remain poorly understood. Here we illustrate how to characterize the deformation, strain, and stretch in swelling brains using nonlinear finite element simulations. For a personalized swelling simulation, we show that even small swelling volumes of 28 to 56 ml can induce maximum stretches on the order of 1.3, well beyond the safety limit. Our study suggests that the locations of maximum stretch and the associated failure modes of stretch and shear are universally shared amongst all swelling brains. Modeling brain tissue as a multiphase material allows us to explain the mechanisms of swelling and make informed predictions about the accumulation of fluid in pathological conditions such as hydrocephalus or in response to traumatic brain injury. In combination with personalized simulations, multiphase modeling of the human brain tissue can guide surgical treatment planning with the ultimate goal to reduce brain damage and improve the structural and functional outcomes of neurosurgical procedures.

DAY 2 - 9 MAY

Session program

8:30-9:10	<p>Plenary speaker: Plenary Hall Ellen Kuhl - Stanford University <i>The poroelastic behavior of the human brain</i> Chair: Rainer Helmig</p>
Parallel session-1	
9:20 - 10:50	<p>Parallel session-1: Room 1 GS3: Experimental achievements Chairs: Al Cunningham, Linda Abriola</p>
9:20	Session opening
9:22	Qingyang Lin: Imaging of single and multi-phase flow in porous rocks with sub-resolution micro-pores using X-ray microtomography
9:40	Luwen Zhuang: Experimental investigation of hysteretic dynamic capillarity effect in unsaturated flow
9:58	Alizée Lehoux: What we can learn about transport, dispersion and adsorption of colloidal particles from MRI (Magnetic Resonance Imaging)
10:16	Gerd Mikolajczyk: Colloid deposition in monolithic porous ceramics - experimental investigations using μ CT and MRI
10:34	Guytaine Desmarais: Sorption in porous media spatially documented with simultaneous measurements of moisture content and temperature variations
9:20 - 10:50	<p>Parallel session-1: Room 2 GS4: Porous media applications Chairs: Michael A. Celia, Anozie Ebigbo</p>
9:20	Session opening
9:22	Manuel Hirschler: Modelling of pore formation in porous polymer membranes during phase inversion process
9:40	Thomas Arends: Scaling in hygromorphic response dynamics of wood
9:58	Maria Elenius: Storage feasibility in North Sea aquifers: Case studies from integration activities
10:16	Ahmed AlRatrou: Automatic estimation of contact angle from pore-scale X-ray 3D-images
10:34	Lou Kondic: Mathematical modeling of optimal membrane filtration
9:20 - 10:50	<p>Parallel session-1: Room 3 MS1.14: Thermo-hydro-mechanics of porous media Chairs: D. Taborda, P. Vardon and A. Leung</p>
9:20	Session opening
9:22	Davide Vitali: Evaluating the influence of temperature on the hydraulic properties of unsaturated soils: a new soil column apparatus for transient-state tests
9:40	S. A. Ghoreishian Amiri: Coupled THM constitutive model for porous materials under frost action: Application to frost heave simulation
9:58	Phillip Vardon: The design of a new field-scale energy pile experiment
10:16	Richard Bakker: Hydraulic properties of siliciclastic geothermal reservoir rocks under triaxial stress conditions, a multidisciplinary approach
10:34	Sayantana Ganguly: Thermal performance of an aquifer while charging-discharging thermal energy

9:20 - 10:50	Parallel session-1: Room 4 MS2.3: Pore-scale study of fluid flow in tight porous media Chairs: J. Yao
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Bijoy Bera: Roughness induced oil trapping in microchannels Hongjun Yin: A study on transient inflow performance relationship considering production history in tight oil reservoirs Peyman Mostaghimi: Numerical characterisation of coal fracture systems and prediction of coal petrophysics Staffan Lundstrom: Three dimensional effects in flow through thin porous media Leonardo Ruspini: Multiscale random walk simulations for computing effective electrical properties in heterogeneous rocks
9:20 - 10:50	Parallel session-1: Room 5 MS2.13: Multiscale Methods and Uncertainty Quantification for Porous Media Flows and Seismic Inversion Chairs: F. Pereira, A. Rahunathan and F. S. de Sousa
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Marcio Borges: Characterization of rock properties in coupled fluid flow and geomechanics problems Felipe Pereira: Model validation for porous media flows Rafael T. Guiraldello: Multiscale mixed methods for subsurface flow problems Fabricio S. Sousa: An Efficient multiscale method for two-phase subsurface flows Arunasalam Rahunathan: Flow forecasting of contaminants in an aquifer
9:20 - 10:50	Parallel session-1: Room 6 MS2.18: Recent advancement in modelling gas transport in confined sub-micron pore space Chairs: J. Ma, Y. Zhang and J. Yao
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Jinjie Wang: Measurements of gas adsorption/desorption and diffusion in sub-micron pore of shale Ferdin Don Bosco: Low variance gas kinetic particle based solver for simulating shale gas transport in ultra-tight porous media Yonghao Zhang: Modelling gas transport in shales Huaimin Dong: 3D digital core modeling and electrical simulation of natural gas hydrate Mingzhe Dong: Delayed adsorption/desorption-flow in shale gas production
9:20 - 10:50	Parallel session-1: Room 7 MD2: Multi-disciplinary Chairs: Ronni Pinny; Thomas Hiller
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Faisal Al Saadi: Dielectric properties of Natural porous media Mojtaba Seyyedi: Experimental Investigation of the Performance of Carbonated (CO ₂ -saturated) Low Salinity Brine Injection as a Novel EOR Scenario Rebecca Allen: Forecasting the migration of a buoyant fluid using spill-point analysis, with application to uncertainty quantification of CO ₂ storage capacity in structural traps Brent Sleep: Two-dimensional Modeling of Polymer Stabilized Nano-scale Zero Valent Iron Transport in Porous Media Swejj Shah: Preparing multi-pore homogeneous and layered cores for controlled flooding experiments



Delftulip is the online information and communication platform for international students of TU Delft.

Parallel session-2

Parallel session-2	
11:20 - 12:50	Parallel session-2: Room 1 MS1.2: Mathematical methods for compositional and reactive flows in porous media Chairs: A. Mailybaev, H. Bruining and D. Marchesin
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Grigori Chapiro: Combustion enhance recovery of shale gas Eduardo Abreu: On the late time behavior of a relaxation compositional flow problem modelling the injection of heated fluid in a porous media Mark Khait: Operator-Based Linearization for the robust subsurface simulation Alexei Mailybaev: Four decades of front tracking for flow in porous media Max Endo Kokubun: A theory for multicomponent liquid-gas filtration combustion
11:20 - 12:50	Parallel session-2: Room 2 MS1.10: Interfaces in porous media: modelling concepts, experiments and solution strategies Chairs: I. Rybak, R. Helmig, K. Weishaupt
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Brandy Pilapil: Emulsion Flow in Different Wettability Pores Studied using 4D Image Analysis Maria Pool: Effects of temporal fluctuations on mixing of two fluids for a stable stratification Pascal Benard: Pore-scale mechanisms of water repellency in the rhizosphere Meritxell Gran: Experimental study of relative permeability and saturation variations in a fractured basalt core Shyam S. Gopalakrishnan: Scaling of convective velocities in buoyancy-driven instabilities of miscible interfaces
11:20 - 12:50	Parallel session-2: Room 3 MS1.16: Fundamentals of flow and transport through reactive porous media and applications Chairs: V. Prigiobbe and M.A. Hesse
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Chinar Rana: Viscous fingering instability in reactive systems Thomas D. S. Oliveira: Pore-scale modelling of multispecies reactive processes: impact of physical and chemical heterogeneities studied on pore-space images Marcello Budroni: Classification of cross-diffusion-driven convection in 3-component double-layer systems: theory and experiments Andres Clarens: Use of functionalized nanoparticles to selectively control permeability in porous media Colin McNeece: Chromatographic analysis of the salinity-acidity system
11:20 - 12:50	Parallel session-2: Room 4 MS2.3: Pore-scale study of fluid flow in tight porous media Chairs: J. Yao
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Renyuan Sun: Pore size characterization and adsorption property evaluations of shales in China Lei Liu: Sensitivity analysis of the effect of micro-fractures on petrophysical properties of tight reservoir Yingfang Zhou: Pore scale modelling of multiphase flow in mixed-wet porous media using a coupled Level Set with Volume of Fluid Method (CLSVOF) Victor Gutierrez: Modelling the surface effect of multi-wet pores of source rocks on multiphase flow Xiaoguang Yin: Pore-scale simulation of two-phase flow in porous media and upscaling: Volume of Fluid (VOF) and pore network study
11:20 - 12:50	Parallel session-2: Room 5 MS2.21: Numerical Methods for Coupled Problems in Porous Media Chairs: A. Nagel, A. Vogel and T. Wick
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Tuanny Cajuhi: Phase-field modeling of fracture in partially saturated porous media Florin Radu: A robust numerical scheme for two-phase flow in porous media Katharina Heck: The dumux- multidimension module for coupled problems in porous media Maik Schenke: Simulation of multi-physics materials in commercial softwares Andreas Vogel: Parallel and adaptive finite volume simulations for density driven flow

11:20 - 12:50	Parallel session-2: Room 6 MS2.18: <i>Recent advancement in modelling gas transport in confined sub-micron pore space</i> Chairs: J. Ma, Y. Zhang and J. Yao
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Shiqi Liu: Pore-fracture network of high-rank coal based on the three-dimensional digitalization modeling Jingsheng Ma: Challenges in ultra-tight rock characterisation for fluid flow modelling in digital core analysis Guan Qin: An upscaling workflow to predict macro-scale transport properties in gas shales by coupling molecular dynamics simulation with lattice Boltzmann method Jens Eller: Quantifying effective diffusivity of porous binder of fuel cell gas diffusion layers Minh-Tuan Ho: Pore-scale modelling of gas flow in porous media
11:20 - 12:50	Parallel session-2: Room 7 MS3.7: <i>Tight rocks: pore structure characterization and implications for transport and mechanical properties</i> Chairs: L. Leu, P. Bertier and A. Busch
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Ernest Rutter: On the hydraulic conductivity of thin, planar cracks in shale and tight sandstone as a function of shear and normal stress Ronny Pini: Microporous rocks: insights from gas adsorption experiments Elke Jacobs: Lithological variations in the Boom Clay: effect on the porous network and transport parameters Eric Letham: Validating the use of gas slippage measurements for pore structure characterisation by comparison with predictions from bundle of capillary tubes models Maartje Houben: Pore network and permeability of the Whitby Mudstone (UK)
11:20 - 12:50	Parallel session-2: Room 8 MS4.1: <i>Porous electrodes for desalination and environmental applications</i> Chairs: K. Smith, S. Porada, M. Suss and M. Biesheuvel
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Kyle Smith: Porous-media flow, ionic transport, and dispersion in Na-ion desalination devices and redox flow batteries Maarten Biesheuvel: Water desalination using capacitive electrodes: from carbon nanotube membranes to activated carbon suspensions Xiaoyu Hu: A molecular theory for optimal blue energy extraction Xiao Su: Nanostructured pseudocapacitive electrodes for water purification and environmental remediation Matthijs de Winter: Designing and testing universal ion-exchange membranes based on carbon nanotubes
Invited speakers	
14:00 - 14:30	Invited speaker: Room 1 Kurosch Rezwani: Porous advanced ceramics for novel applications Chair: Ilenia Battiato
14:00 - 14:30	Invited speaker: Room 2 Kent-Andre Mardal: Computational modeling of the glymphatic system: how is waste cleared from the brain? Chair: Adrienne Phillips
14:00 - 14:30	Invited speaker: Room 3 Andrea Schnepf: Modelling soil-root interactions Chair: Stefan Luding
14:00 - 14:30	Invited speaker: Room 4 Jonas Toelke: Multiscale imaging and upscaling using machine learning Chair: Karsten Thompson
14:00 - 14:30	Invited speaker: Room 5 Noushine Shahidzadeh: Salt crystallization in porous media Chair: Renyuan Sun
14:00 - 14:30	Invited speaker: Room 6 Derek Elsworth: Seismicity-permeability Coupling in porous and fractured media Chair: Maarten Biesheuvel

Poster pitch presentation session

14:40 - 15:40	Poster pitch presentation session: Room 1 GS1 [MS1.1+MS1.7+MS1.8+MS1.12+MS1.15] Chairs: Donald Brown, Burt Tilley		
	14:40 Session opening 14:42 <i>Brucker BioSpin</i> 14:45 Emil Gallyamov 14:48 Laura Pyrak-Nolte 14:51 Antonio R. de Castro 14:53 Michael Eden 14:56 Antti Hannukainen 14:59 Helmut Geistlinger	15:02 Rakulan Sivanesapillai 15:05 Mehrez Agnaou 15:08 Saeed Salimzadeh 15:11 Tony Zaouter 15:14 Matthieu Mascle 15:17 Young June Yoon 15:20 Sylvain Pasquier	15:23 Lianyu Yu
14:40 - 15:40	Poster pitch presentation session: Room 2 GS1 [MS1.3+MS1.11+MS1.13+MS1.14] Chairs: Tanguy Le Borgne, Yonghao Zhang		
	14:40 Session opening 14:42 <i>Synopsys-Simpleware</i> 14:45 Mariusz Kaczmarek 14:48 Kieu Hiep Le 14:51 Marcus Alexandersson 14:53 Hans Janssen 14:56 Lynn Schreyer 14:59 Mouadh Addassi	15:02 Arda Yildirim 15:05 Christopher Dobrzanski 15:08 Martin Nopens 15:11 Thibault Lerouge 15:14 Mingyang Chen 15:17 Manuel Brinker 15:20 Gerhard H. Findenegg	15:23 Quy-Dong To
14:40 - 15:40	Poster pitch presentation session: Room 3 GS2 [MS2.3+MS2.4+MS2.6+MS2.12+MS2.17+MS2.18+MS2.19+MS2.21+MS2.27] GS3 [MS3.2+MS3.3+MS3.4+MS3.6] Chairs: Lisa Joss, Nicola Castelletto		
	14:40 Session opening 14:42 <i>Volume Graphics</i> 14:45 Dirk Müter 14:48 Loïc Dijous 14:51 Joachim Moortgat 14:53 Alireza Pourbakhtiar 14:56 Chiyu Xie 14:59 Ali Al-Maktoumi	15:02 Laigui Wang 15:05 Anuradha Bhatia 15:08 Muhammad Sohal 15:11 Yaqi Zhang 15:14 Anthony Leung 15:17 Roger Knutsson 15:20 Lucas Oosterhout	15:23 Junjian Wang 15:26 Galina Printsypar
14:40 - 15:40	Poster pitch presentation session: Room 4 GS4 [MS4.1+MS4.2+MS4.3+MS4.5+MS4.8+MS4.11] Chairs: Vittorio Di Federico, Konrad Steiner		
	14:40 Session opening 14:42 <i>MaP-Microstr. & Pores</i> 14:45 Hammad R. Khalid 14:48 Robabeh Moosavi 14:51 Philippe Gentillon 14:53 Nick Janssens 14:56 Clement Roques 14:59 Pei-Yi Chang	15:02 Pietro de Anna 15:05 Laurenz Schröer 15:08 Odd Andersen 15:11 Nicole Vorhauer 15:14 Mohsin Qazi 15:17 Salome Shokri-Kuehni 15:20 Nidal Ben Abdelouahab	15:23 Arsha Shiri 15:26 Sela Samin 15:29 Tania Mubita 15:33 Michael Lacey

Parallel session-3

16:45 - 18:15	<p>Parallel session-3: Room 1 <i>MS1.3: Fluids in Nanoporous Media</i> Chairs: G. Gor and P. Huber</p>
16:45 16:47 17:05 17:23 17:41 17:59	<p>Session opening Alexander V. Neimark: Adsorption stress and deformation of nanoporous solids Roland Morak: The influence of micropores and organic residues on the adsorption-induced deformation of hierarchical structured porous solids Dominique Derome: Hygromechanical behavior of biopolymeric nano-composite material: from MD simulations to poromechanics Rolf Pelster: Elastic properties of fluids adsorbed in nanopores Gennady Y. Gor: Elasticity of fluid in solvophilic and solvophobic confinement</p>
16:45 - 18:15	<p>Parallel session-3: Room 2 <i>MS1.1: Advances in the application of periodic and stochastic homogenisation to transport models and multi-physics simulation in porous media</i> Chairs: M. Icardi, A. Mikeli, N. Ray, M. Schmuck, F. Theil, T. Kuusi and S. Armstrong</p>
16:45 16:47 17:05 17:23 17:41 17:59	<p>Session opening Julian Fischer: Quantitative stochastic homogenization: Recent advances and perspectives Thomas Wick: Phase-field fracture propagation in porous media Antonios Ververis: Computational investigation of a novel porous media phase field equation: convergence and coarsening rates Svyatoslav Korneev: Sequential homogenization of reactive transport in polydisperse porous media Kirill Cherednichenko: Extreme localisation property for eigenfunctions of one-dimensional high-contrast periodic problems with a defect</p>
16:45 - 18:15	<p>Parallel session-3: Room 3 <i>MS2.5: Poroviscohyperelastic Computational Models for Geophysics and Biomechanic Applications</i> Chairs: P. Zunino, L. Formaggia and A. Scotti</p>
16:45 16:47 17:05 17:23 17:41 17:59	<p>Session opening Paolo Zunino: Numerical approximation of flow through fractures in poroelastic media Shubhangi Gupta: A large deformation poro-elasto-plastic model for modelling sand production during gas production from methane hydrate reservoirs Manuel Borregales: Linearization techniques for non-linear Biot's model Sarah Gasda: Model comparison for geomechanical simulation of large-scale CO2 storage Nicola Castelletto: Hybrid MultiScale Finite Element-Finite Volume Framework for the Coupled Biot's Equations</p>
16:45 - 18:15	<p>Parallel session-3: Room 4 <i>MS2.17: Subsurface flow simulations in poro-fractured media: advances in numerical methods</i> Chairs: S. Berrone, S. Pieraccini and S. Scialo</p>
16:45 16:47 17:05 17:23 17:41 17:59	<p>Session opening Julian Hennicker: Schemes for Flows in Porous Media with Fractures Stefano Berrone: Large Scale Discrete Fracture Network flow and transport simulations with non-conforming meshes Stefano Scialò: An optimization approach for flow simulations in 3D poro-fractured media Rajdeep Deb: Modeling injection induced shear failure in thermo-hydro-mechanically coupled fractured domains using an extended finite volume method (XFVM) Brijesh Kumar: Robust gridding and discretization for modelling flow in discrete fracture network medium</p>

16:45 - 18:15	Parallel session-3: Room 5 MS2.21: Numerical Methods for Coupled Problems in Porous Media Chairs: A. Nägel , A. Vogel and T. Wick
16:45 16:47 17:05 17:23 17:41 17:59	Session opening Maicon Correa: Numerical Model for Three-Phase Flow in Poroelastic Media Laurent Orgogozo: Coupled water and energy transfers in porous media with freeze/thaw: permaFoam, a massively parallel OpenFOAM® solver Dmitry Logashenko: Validity of models of density-driven flows in porous media with low-dimensional fractures Cong Yu: A full 3D mixed hybrid finite element model of superabsorbent polymers Jingqian Ding: Swelling driven crack propagation in large deformation in porous media
16:45 - 18:15	Parallel session-3: Room 6 MS3.1: Application of NMR Methods to Porous Media Chairs: A. Pohlmeier, C. Arns, M. Appel and Jan Vanderborght
16:45 16:47 17:05 17:23 17:41 17:59	Session opening Siegfried Stapf: NMR relaxometry investigations of molecular interaction with clean and paramagnetic surfaces Xin Cai: Water content in natural soil by low-field NMR Henk Van As: Estimating microstructural length scales in biopolymer hydrogels by PFG NMR nanoprobe diffusometry Leo Pel: Wick action in porous materials as studied by NMR Ahmed Barakat: Refractory spalling of castables during first-drying: an NMR study
16:45 - 18:15	Parallel session-3: Room 7 MS4.2: Geothermal Energy Chairs: A. Ebigbo, I. Berre
16:45 16:47 17:05 17:23 17:41 17:59	Session opening Yangsheng Zhao: Online-experiment investigation of permeability ore-bearing rock under the stress-temperature and the evolution pore-fissure in microscopic structure Stephen Varghese: Enhanced geothermal systems using chaotic advection Inga Berre: An approach for simulation of hydraulic stimulation of a fractured geothermal reservoir Raphael Allstadt: Reservoir modeling of a CO ₂ plume geothermal system Negar Daemi: Geothermal systems performance assessment and environmental impacts

Keukenhof, Lisse



Tuesday 9 May 2017

Dinner at the Laurens Church

Time	Activity
19:00	Reception
19:15	15 min. Live Organ Music (within the reception)
19:30	Start Dinner
20:50	10 min. Proctor & Gamble Award
21:00	Main Dish
21:55	10 min. Honorary Lifetime Membership Award
22:10	Desserts
22:45	Coffee/Last drink
23:00	Closure

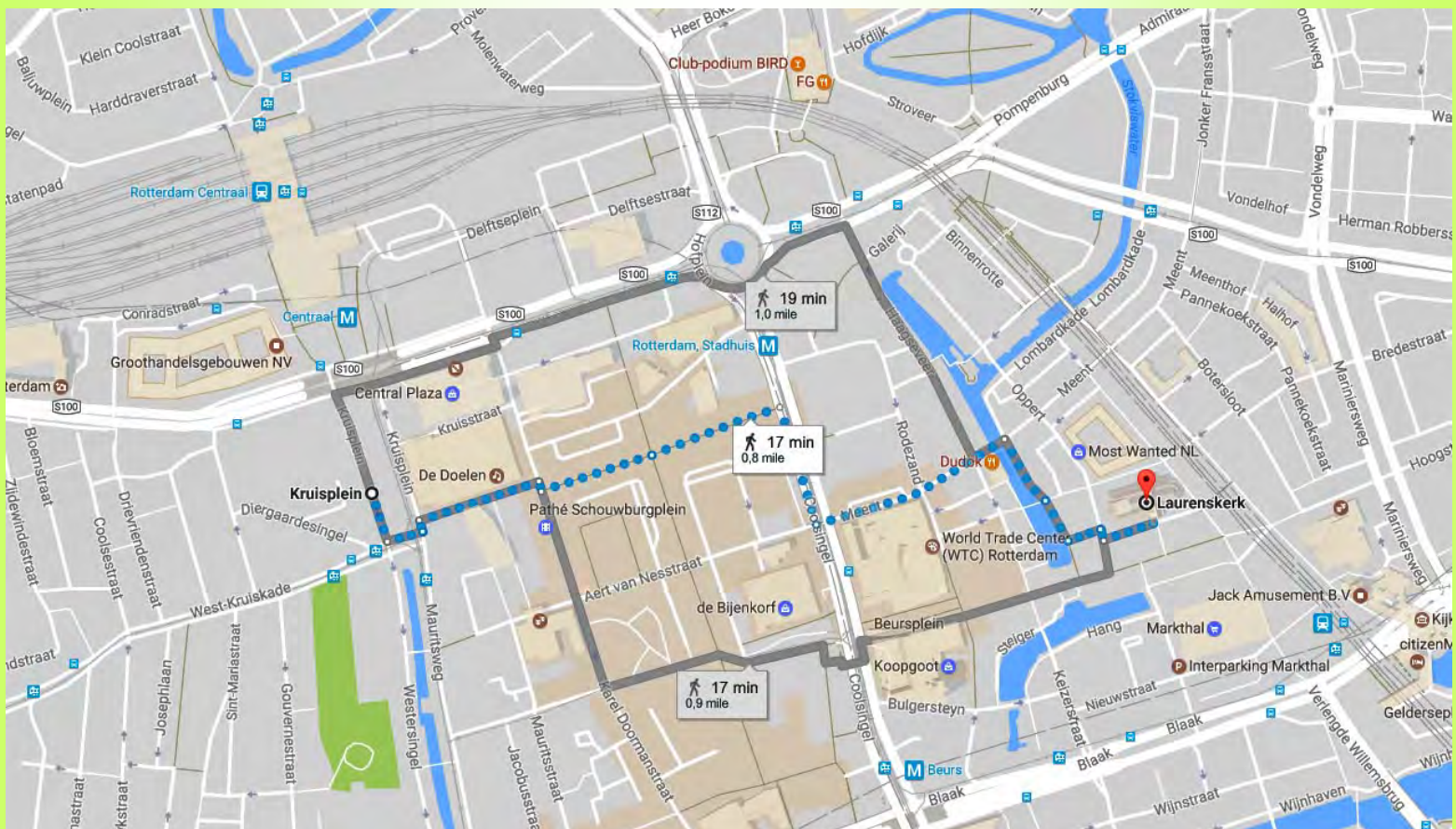


1. Head south on Kruisplein toward 'West-Kruiskade'
2. Turn left to stay on Kruisplein
3. Turn right onto Schouwburgplein
4. Turn right onto Karel Doormanstraat
5. Turn left onto Korte Lijnbaan
6. Continue onto Stadhuisplein
7. Turn right onto Coolingsingel
8. Turn left onto Meent
9. Turn right onto Delftsevaart
10. Continue onto Grotekerkplein (Grand church square)
11. Turn left to stay on Grotekerkplein
12. Number 27



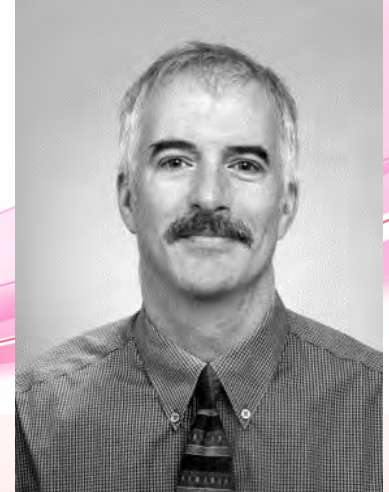
LAURENSKERK

Grotekerkplein 27
3011 GC Rotterdam



Robert Zimmerman

Imperial College London



The effect of pore structure and pore fluid on the elastic moduli and wave speeds in porous rocks

The speeds at which elastic waves travel through a fluid-saturated porous rock will depend on the mineral composition of the rock, the pore geometry, and the pore fluid properties. Since the pore structure of a rock will vary with the external stress and fluid pressure, the wave speeds will generally vary with stress. Additionally, since the ability of the pore fluid to contribute to the elastic stiffness of the rock-fluid system depends on the ease with which the fluid can move into or out of a pore as it is being compressed by a passing wave, the wave speeds will also be functions of the pore fluid viscosity and wave frequency. Various effective medium theories, such as the Mori-Tanaka model or the differential effective medium approach, can be used to relate the elastic moduli of the rock to its pore structure. The effect of stress on the elastic moduli can be accounted for by combining an effective medium prediction for cracked rocks with an equation that describes crack closure under stress. The effect of pore fluids, however, depends on the frequency regime. At sufficiently high frequencies, the pore fluid will not have time sufficient to travel between adjacent pores during the period of the wave, and can be considered to be “trapped”. In this regime, the effective moduli of the fluid-saturated rock can be calculated from an effective medium theory, with the fluid-filled pores considered as isolated inclusions in a rock matrix. At very low frequencies, the fluid has sufficient time to drain out of any pore as it is compressed by the wave, and the effective elastic moduli of the rock-fluid system will correspond to the drained (i.e., dry) limit. It is generally assumed that there exists an intermediate range of frequencies in which the fluid is able to travel between adjacent pores, so as to locally equilibrate the fluid pressure, but cannot fully drain out of the region of rock that is compressed by the passing wave. In this case, Gassmann’s equation can be used to predict the stiffening effect that the fluid has on the rock-fluid system. In this talk, I will present some of the models that have been developed to relate the wave speeds to pore structure, and to account for the effect of stress. The predictions of these models will be tested against experimental data on sandstones. Finally, the applicability of Gassmann’s equation will be discussed in light of available experimental results.

DAY 3 - 10 MAY

Session program

8:30-9:10	<p>Plenary speaker: Plenary Hall Robert Zimmerman - Imperial College London <i>The effect of pore structure and pore fluid on the elastic moduli and wave speeds in porous rocks</i> Chair: William Rossen</p>
Parallel session-1	
9:20 - 10:50	<p>Parallel session-1: Room 1 GS1: Fundamental theories of porous media Chairs: Peixue Jiang, Hadi Hajibeygi</p>
9:20	Session opening
9:22	Yaniv Ederly: Surfactant variations in porous media localize capillary instabilities during Haines jump
9:40	Parisa Bazazi: Unraveling the mechanism of dynamic emulsion formation in transparent porous medium
9:58	Signe Kjelstrup: Two-phase flow in porous media - as seen from thermodynamics
10:16	Dick Bedeaux: Ensemble distribution for immiscible two-phase flow in two-dimensional networks
10:34	Maja Ruecker: Impact of wettability at the pore scale flow regime
9:20 - 10:50	<p>Parallel session-1: Room 2 MS1.3: Fluids in Nanoporous Media Chairs: G. Gor and P. Huber</p>
9:20	Session opening
9:22	David Grosso: Sol-gel films and their properties related to nanoporosity
9:40	Viktor Soprunyuk: Low-frequency dynamics of water confined in nanopores
9:58	Gerhard H. Findeneegg: Freezing and melting of aqueous salt systems in nanopores
10:16	Rustem Valiullin: Phase transitions in disordered porous solids
10:34	Anton Belogorlov: The relaxation of metastable state method for recovery of distribution of captured non-wetting liquid dispersed in nanoporous medium
9:20 - 10:50	<p>Parallel session-1: Room 3 MS2.27: Upscaling of fluid flow in fractured rocks Chairs: P.N. Sævik and A. Ebigbo</p>
9:20	Session opening
9:22	Florian Doster: Improved Dual Porosity Modelling of Multiphase Flow Phenomena
9:40	Mohammad Karimi-Fard: Aggregation-based upscaling technique for flow in fractured porous media
9:58	Daniele Pedretti: Is nonlocality controlling the ergodicity of hydraulic properties in fractured formations? An analysis based on transfer functions
10:16	Pal Sævik: Using topology to estimate effective fracture permeability
10:34	Bowen Ling: Dispersion in hyperporous fractured systems and the impact of matrix permeability on fracture transmissivity

9:20 - 10:50	Parallel session-1: Room 4 MS3.1: Application of NMR methods to porous media Chairs: A. Pohlmeier, C. Arns, M. Appel and Jan Vanderborght
9:20	Session opening
9:22	Gaétan Gerber: Coupled NMR-Minispec and MRI evaluations of the transport and clogging of non-colloidal particles in porous media
9:40	Joseph Seymour: MRI measurement and numerical simulation of coupled fluid flow and heat transfer in phase change material (PCM) porous media
9:58	Ioan Ardelean: NMR relaxation in partially saturated pores: applications to cement paste and carbon xerogels
10:16	Igor Shikhov: Characterization of fractured outcrop chalk using relaxation and relaxation exchange low-field NMR
9:20 - 10:50	Parallel session-1: Room 5 MS4.15: Porous media flow in biological systems Chairs: T. Koppl and R. Helmig
9:20	Session opening
9:22	Miroslav Kuchta: Observations on preconditioning the 3d-1d coupled problems
9:40	Dominique Derome: Moisture-driven cellular deformation in thick- versus thin-walled cell plant systems
9:58	Behdad Pouran: Multi-scale characterization of diffusion phenomenon at the interface of cartilage and bone
10:16	Katrin Huber: Coupled root water and solute uptake – a functional structural model
10:34	Bagus Putra Muljadi: The effects of microporosity on thermoregulation and ventilation in termites's mounds from pore-scale simulation in Micro-CT images
9:20 - 10:50	Parallel session-1: Room 6 MS4.10: Foam in porous media for petroleum and environmental engineering: Experience sharing Chairs: H. Bertin and W.R. Rossen
9:20	Session opening
9:22	Bander AlQuaimi: Study of foam generation and propagation in fully characterized physical-model fracture
9:40	J. Tang: Experimental investigation of the effect of oil on steady-state foam flow in porous media
9:58	Sian Jones: Foam coarsening: behaviour and consequences in a model porous medium
10:16	Clement Portois: Multi-scale experimental study to define the effectiveness of foam to reduce global mobility in an aquifer
10:34	Henri Bertin: Polymer reinforced foam: influence of polymer composition
9:20 - 10:50	Parallel session-1: Room 7 MD3: Multi-disciplinary Chairs: Benoit Noetinger; Yaniv Edery
9:20	Session opening
9:22	Odile Crabeck: Characterization of sea ice porosity as a function of temperature in first year sea ice using micro CT X-ray tomography
9:40	Sönke Maus: A sea ice pore space analysis in terms of 3-d directed percolation
9:58	Norbert Klitzsch: Understanding the Impedance Spectroscopy Response of Rocks – Recent Developments in Geophysics
10:16	Negar Khoshnevis Gargar : Effects of water on light oil recovery by air injection
10:34	Benoit Noetinger: Hydrodynamic finite-size effects on diffusion under extreme confinement



De Doelen & Plenary hall

Central Station Rotterdam

Parallel session-2

11:20 - 12:50	<p>Parallel session-2: Room 1</p> <p>MS1.3: Fluids in Nanoporous Media</p> <p>Chairs: G. Gor and P. Huber</p>
<p>11:20 11:22 11:40 11:58 12:16 12:34</p>	<p>Session opening</p> <p>Michael Froeba: Phase behavior of confined water in nanoporous organosilica hybrid materials with a periodically modulated surface polarity</p> <p>Kathrin Sentker: Molecular orientation of a discotic liquid crystal in nanoporous solids</p> <p>Michael Steiger: Freezing temperatures and solubilities in confined electrolyte solutions</p> <p>Cedric Gommès: Capillary condensation in disordered mesopores</p> <p>Matthias Thommes: Insights into the adsorption and phase behaviour of fluids in nanoporous materials with hierarchical pore structure: Towards an advanced structural characterization</p>
11:20 - 12:50	<p>Parallel session-2: Room 2</p> <p>MS1.10: Interfaces in porous media: modelling concepts, experiments and solution strategies</p> <p>Chairs: I. Rybak, R. Helmig, K. Weishaupt</p>
<p>11:20 11:22 11:40 11:58 12:16 12:34</p>	<p>Session opening</p> <p>Kamaljit Singh: Dynamics of pore-filling and snap-off events during imbibition in carbonate rocks</p> <p>Marco Dentz: Fluctuating interfaces in disordered media and their macroscopic representation</p> <p>Steffen Schlueter: Time scales of relaxation dynamics during hydraulic non-equilibrium in two-phase flow</p> <p>Douglas Meisenheimer: Bubble Formation and its Effect on Interfacial Area Evolution and Topology in Two-Phase Flow</p> <p>David Seus: Model based domain decomposition methods for partially saturated flow in porous media</p>
11:20 - 12:50	<p>Parallel session-2: Room 3</p> <p>MS2.6: Nonstandard models for flows in porous media</p> <p>Chairs: I.S. Pop</p>
<p>11:20 11:22 11:40 11:58 12:16 12:34</p>	<p>Session opening</p> <p>Alexander Shapiro: Mechanics of the liquid-liquid interface under two-phase immiscible flows in porous media</p> <p>Nicolas Leroux: Preferential flow through subfreezing heterogeneous snowpacks with fully capillary hysteresis</p> <p>Marie-Christine Neel: Determining the mobile water content of a non-saturated porous material with a fractional advection diffusion equation</p> <p>Iryna Rybak: Coupling porous-medium and free-flow systems: alternative model formulation and validation</p> <p>Koondanibha Mitra: Traveling wave solutions of Richards equation with gravity for general non-equilibrium capillarity pressure conditions</p>
11:20 - 12:50	<p>Parallel session-2: Room 4</p> <p>MS2.17: Subsurface flow simulations in poro-fractured media: advances in numerical methods</p> <p>Chairs: S. Berrone, S. Pieraccini and S. Scialo</p>
<p>11:20 11:22 11:40 11:58 12:16 12:34</p>	<p>Session opening</p> <p>Xavier Raynaud: Fully-coupled poro-elasticity simulations on irregular grids using a black-oil flow model</p> <p>Michael G Edwards: Control-volume distributed multi-point flux approximation (CVD-MPFA) on unstructured grids: Recent developments, fracture models and grid constraints</p> <p>Matei Tene: Projection-based embedded discrete fracture model</p> <p>Eirik Keilegavlen: Simulation of geothermal energy extraction on realistic geologies using the dual virtual element method</p> <p>Tri Dat Ngo: A new fracture network conform mesh used to obtain transport reference simulations</p>
11:20 - 12:50	<p>Parallel session-2: Room 5</p> <p>MS2.22: Characterizing and modeling geochemical reaction processes from the pore to continuum scale</p> <p>Chairs: C. Tournassat, C.I. Steefel and S. Molins</p>
<p>11:20 11:22 11:40 11:58 12:16 12:34</p>	<p>Session opening</p> <p>Virginie Marry: Multi-scale modeling of dynamics in clay/water systems</p> <p>Johannes Kulenkampff: Visualizing concentration distributions in macroscopic samples in the course of geochemical processes</p> <p>Hongkyu Yoon: Multiscale characterization of carbonate rock deformation due to dissolution, precipitation, and compaction during core flooding of reactive fluid</p> <p>Jordi Cama: Reactive surface areas in 1D and 2D RT simulations of the interaction between sedimentary rocks and CO₂-rich waters</p> <p>Jenna Poonoosamy: Dissolution-precipitation processes in tank experiments: an experimental benchmark and modelling strategies</p>

11:20 - 12:50	Parallel session-2: Room 6 MS4.10: Foam in Porous media for Petroleum and Environmental Engineering: Experience Sharing Chairs: H. Bertin and W.R. Rossen
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Juan Manuel Mejia Cardenas : Creation of in-situ EOR foams by the injection of dispersed foamer in gas, and its application in a Piedemonte pil field (Colombia) Juan David Valencia: Evaluation of water drying due to gas injection in foam-based well conformance operations and its effects in foam generation and stability Yves Méheust: Evolution of the bubble size distribution in a foam flowing through a 2D porous medium Nima Shokri: The influence of pore geometry on foam generation and oil displacement in porous media Richard Martel: Shear thinning foam injection as a remediation strategy for NAPL source zone
11:20 - 12:50	Parallel session-2: Room 7 MS2.29: Uncertainty quantification and multiple scale methods for porous media Chairs: M.M. Nezhad, M. Rezania and V. Niasar
11:20 11:22 11:40 11:58 12:16 12:34	Session opening Matteo Icardi: Upscaling particle dispersion and reaction in random flow fields Thi Minh Hue Le: Influence of flow characteristics on rainfall-triggered instability of heterogeneous unsaturated slope Jin Meng: Uncertainty quantification for flow in heterogeneous media with sparse polynomial chaos expansion constructed by feature selection Mohaddeseh Mousavi Nezhad: Uncertainty of suction measurement with tension-meters Juan Chiachio-Ruano: A Bayesian assessment of an analytical model for steady-state flow in multi-layered porous media with applications to railway track drainage
Invited speakers	
14:00 - 14:30	Invited speaker: Room 1 Insa Neuweiler: Double continuum models for two-phase flow and transport in porous media Chair: Inge Berre
14:00 - 14:30	Invited speaker: Room 2 Natalie Schroeder: Mathematical modelling of mechanical dewatering of a paper web inside a press nip Chair: Daniel Bonn
14:00 - 14:30	Invited speaker: Room 3 Wolfgang Ehlers: A TPM-based investigation of fracking processes in saturated porous media Chair: Rolf Pelster
14:00 - 14:30	Invited speaker: Room 4 Michel Louge: Applications of statistical mechanics to hysteretic capillary phenomena: ab initio predictions of contact angle on rough surfaces and of liquid retention in unsaturated porous media Chair: Tannaz Pak
14:00 - 14:30	Invited speaker: Room 5 Masoud Jabbari: Continuum approach in modelling and simulations of ceramic manufacturing processes Chair: Anna Scotti
14:00 - 14:30	Invited speaker: Room 6 Bernhard Schrefler: A multiphase porous media model for tumor growth and drug delivery Chair: Sarah Gasda

Poster pitch presentation session

14:40 - 15:40	Poster pitch presentation session: Room 1 GS1 [MS1.2+ MS1.4+MS1.5+MS1.6+MS1.10+ MS1.16] Chairs: Denis Voskov, Agnieszka Budek, Duncan Hewitt		
	14:40 Session opening 14:42 <i>Phenom-World</i> 14:45 Kilian Weishaupt 14:48 Simon Franchini 14:53 Sadjad Mohammadian 14:56 Max Endo Kokubun 14:59 Jakub Solovský	15:02 Bernard Meulenbroek 15:05 Priyanka Agrawal 15:08 Michael Afanasyev 15:14 Max Beving 15:17 Masoud Ghaderi Zefreh	
14:40 - 15:40	Poster pitch presentation session: Room 2 GS2 [MS2.7+MS2.8+MS2.22+MS2.23+MS2.25+MS2.27+MS2.29] Chairs: Hang Deng, Jenna Poonosamy		
	14:40 Session opening 14:42 <i>Braker microCT</i> 14:45 Yue Hao 14:48 Xin Wang 14:51 Olga Fuks 14:53 Claudie Hulin 14:56 Velimir Vesselinov 14:59 Fabian Frie	15:02 Romain Vermorel 15:05 Lazaro Perez 15:08 Tomas Aquino 15:11 Nicole Sund 15:14 Hailun Ni 15:17 Yixin Zhao 15:20 Yuxuan Xia	15:23 Diederik Jacques 15:26 Guillem Solé-Marí
14:40 - 15:40	Poster pitch presentation session: Room 3 GS4 [MS4.6+MS4.7+MS4.9+S4.12+MS4.13] Chairs: Saman Aryana, Sophie Roman		
	14:40 Session opening 14:42 <i>Springer</i> 14:45 Qiuyan Li 14:48 Lijuan Zhang 14:51 Simona Raneri 14:53 Binhui Li 14:56 Sharul Nizam Hasan 14:59 Carlos Herrera	15:02 Micha Schaefer 15:05 Knut Jørgen Måløy 15:08 Avinoam Rabinovich 15:11 Mario Toledo 15:14 Christoph Lehmann 15:17 Marcel Moura 15:20 Martijn Hurkmans	15:23 Michele Celli
14:40 - 15:40	Poster pitch presentation session: Room 4 GS4 [MS4.4+ MS4.10+ MS4.14+ MS4.15] Chairs: Ida Lykke Fabricius, Julian Maes		
	14:40 Session opening 14:42 <i>Math2Market</i> 14:45 Chris Boeije 14:48 Oshri Borgman 14:51 Huanhuan Tian 14:53 Hans Bruining 14:56 Hadise Baghooee 14:59 Lukas Eurich	15:02 Tobias Koepl 15:05 Timo Koch 15:08 Patrick Schroeder 15:11 Trung Hieu Mai 15:14 Lionel Mercury	

Neeltje Jans

Kinderdijk, windmills, water management



Parallel session-3

Parallel session-3	
16:45 - 18:15	<p>Parallel session-3: Room 1</p> <p>SS1: Mechanisms of mechanotransduction: how biology builds smart porous media - A tribute to Prof. Stephen Cowin</p> <p>Chairs: L. Cardoso and J. Huyghe</p>
<p>16:45 16:47 17:05 17:23 17:41 17:59</p>	<p>Session opening</p> <p>Luis Cardoso: The contributions of Steve Cowin to poroelasticity</p> <p>Cecile Baron: Interaction of ultrasound with cortical bone modeled as a two-level porous medium: a multiscale computational study</p> <p>Massimiliano Fraldi: Growth-induced stresses and poroelastic remodelling in mechanotransduction of solid tumors</p> <p>Jinn-Liang Liu: Poisson-Nernst-Planck-Fermi theory for biological ion channels</p> <p>Shakil Masum: Modelling microbial processes in porous media under coupled flow, reaction and deformation phenomena</p>
16:45 - 18:15	<p>Parallel session-3: Room 2</p> <p>MS2.28: Pore-Scale Modeling and Experiments on Multiphase Flow in Porous Media</p> <p>Chairs: P. Kunz, B. Guo, M. Hirschler, C. Qin and U. Tuttlies</p>
<p>16:45 16:47 17:05 17:23 17:41 17:59</p>	<p>Session opening</p> <p>Ivan Lunati: How to improve macroscopic models by pore-scale investigations?</p> <p>John Kerins: Taking time out of the picture: capillarity and permeability behaviors in swelling mixtures of fluff and superabsorbent</p> <p>Nikolaos Karadimitriou: Hydrodynamics of solute transport under two-phase flow conditions: a micromodel study</p> <p>Ying Gao: Multi-phase imaging of fluid rearrangement at steady state during co-injection using X-ray micro-tomography</p> <p>Edo Boek: Pore scale modeling of enhanced oil recovery from two-phase flow simulations on digital images of porous rocks</p>
16:45 - 18:15	<p>Parallel session-3: Room 3</p> <p>MS2.7: Modelling of production from tight reservoirs – which physics is relevant?</p> <p>Chairs: D. Voskov and A. Lapene</p>
<p>16:45 16:47 17:05 17:23 17:41 17:59</p>	<p>Session opening</p> <p>Florian Osselin: Evidence of geochemical rock-water interactions during hydraulic fracturing from the analysis of flowback water</p> <p>Carlos Herrera: Reservoir Simulation Study for a Tight Natural Fracture and Compositional System – Pauto field Case</p> <p>Longlong Li: Optimization for grid strategy and time stepping strategy of multi-time scale simulation</p> <p>Denis Voskov: Multi-scale representation of gas flow in shale formations</p>
16:45 - 18:15	<p>Parallel session-3: Room 4</p> <p>MS2.17: Subsurface flow simulations in poro-fractured media: advances in numerical methods</p> <p>Chairs: S. Berrone, S. Pieraccini and S. Scialo</p>
<p>16:45 16:47 17:05 17:23 17:41 17:59</p>	<p>Session opening</p> <p>Sebastian Echavarría: Hybrid discontinuous Galerkin method applied to the flow problems in highly anisotropic porous media</p> <p>Arne Nägel: Linearly implicit extrapolation methods for density driven flow</p> <p>Anna Scotti: XFEM approximation of flow and transport in fractured porous media</p> <p>Sheng Wang: A conservative level set method for simulating two-phase flows in porous media</p> <p>Fabio Vicini: An MPI parallel code for Discrete Fracture Network flow simulations</p>
16:45 - 18:15	<p>Parallel session-3: Room 5</p> <p>MS2.22: Characterizing and modeling geochemical reaction processes from the pore to continuum scale</p> <p>Chairs: C. Tournassat, C.I. Steefel and S. Molins</p>
<p>16:45 16:47 17:05 17:23 17:41 17:59</p>	<p>Session opening</p> <p>Hang Deng: Investigation of the influence of surface roughness on geochemical reaction rates in fractures</p> <p>Stephane Gaboreau: Imaging a pore network in a clay rock at the sub nanometer scale</p> <p>Christophe Tournassat: Diffusion in clays: Continuum and micro-continuum approaches</p> <p>Cyprien Soulaire: Pore-scale simulation of mineral dissolution</p> <p>Jean-Louis Rouet: Semi-analytical solutions and numerical approach for reactive transfer in a saturated pore network model</p>

16:45 - 18:15	Parallel session-3: Room 6 MS1.4: Effect of Mechanical Deformation and/or Sorption on Flow and Transport in Porous Media Chairs: M. Sahimi and P. Tahmasebi
16:45 16:47 17:05 17:23 17:41 17:59	Session opening Lukasz Jasinski: Effective flow properties assessment of a propped fracture under in-situ conditions – numerical modeling Duncan Hewitt: The coffee press: rapid deformation of a highly deformable porous medium Thomas Sweijen: Grain-scale modelling of swelling granular materials: the effect of particle shape on porosity, permeability and retention properties Meng Zhou: NMR imaging of bound and free water transport during wood imbibition and deformation Zengchao Feng: Improving methane drainage in low-permeability coal seam using the water jet technique
16:45 - 18:15	Parallel session-3: Room 7 MS4.14: Modified-salinity-brine flooding: from pore to field scale Chairs: A.A. Eftekhari, A. Hiorth, A. Revil, H. Mahani, S. Berg, R. Nasralla, A. Fadili and H.M. Nick
16:45 16:47 17:05 17:23 17:41 17:59	Session opening Matthew Jackson: Zeta potential in oil-water-carbonate systems and its impact on oil recovery during controlled salinity waterflooding Espen Jettestuen: Pore scale simulation of electro-chemical induced wettability changes in three dimensional pore scale geometries Ida Lykke Fabricius: Flooding of North Sea chalk and greensand cores with specific brines Julien Maes: Pore scale reactive modelling of dynamic wettability alteration Tadeusz Patzek: An approximate description of the nonequilibrium processes that drive incremental oil recovery in carbonates at high advancing contact angles
18:30 21:00	STUDENT EVENING 'Energy transition Challenge' Bistro Hartig

Willem Burger Foyer, De Doelen



Amir Faghri

University of Connecticut



Advanced micro and miniature energy systems- passive technologies using porous media

21st century will see the development of a wide range of active miniaturized energy devices with application in energy management and power sources, electronic cooling, energy storage and bioengineering. Although these active devices are effective, they are often cumbersome and inefficient considering the auxiliary supporting devices such as pumps, fans, and other moving parts they require for operation. A more efficient and novel approach involves the use of passive small energy and thermal devices with no moving parts. Two research thrusts are passive fuel cells and heat pipes which are discussed. A Miniature passive direct methanol fuel cell (DMFC) that includes a fuel cell stack and ancillary systems with no moving parts will be presented. This system uses passive approaches for fuel storage and delivery, air breathing, water management, CO₂ release, and thermal management. The performance characteristics of the passive miniature DMFC system will be presented. Increasing component densities of the integrated circuit (IC) and packaging level, as well as energy conservation requirements have led to serious challenges in thermal management. Innovative heat pipes and thermosyphons are some of the most promising passive thermal devices because of their high efficiency, reliability and cost-effectiveness. Challenges and opportunities of these devices will be discussed.

DAY 4 - 11 MAY

Session program

8:30-9:10	Plenary speaker: Plenary Hall Amir Faghri - University of Connecticut <i>Advanced Energy Systems– Passive Technologies using Porous Media</i> Chair: Wildenschild Dorthe
Parallel session-1	
9:20 - 10:50	Parallel session-1: Room 1 GS3: <i>Experimental achievements</i> Chairs: Claire Chassagne, Phil Vardon
9:20	Session opening
9:22	Adrienne Phillips: Biomineralization: a strategy to modify permeability in the subsurface
9:40	Roel Hendrickx: Porous microstructure and vapour permeability of traditional canvas paintings
9:58	Mehran I. Mobarakeh: Tank experiments and numerical modeling of macrodispersion of density-dependent transport in stochastically heterogeneous porous media
10:16	Tiziana Tosco: MNM3D: a modelling tool for simulation of nanoparticle injection and transport in 3D geometries
10:34	Serkan Biyik: Effect of type of process control agent on the synthesis and characterization of Cu25W Composite powder
9:20 - 10:50	Parallel session-1: Room 2 GS4: <i>Porous media applications</i> Chairs: Adam Bezuijen, Henk Jonkers
9:20	Session opening
9:22	Anas Hassan: The use of RFID technology to measure dielectric coefficients of diethyl ether-oil-brine mixtures for solvent enhanced imbibition experiments
9:40	Shahrizal Anuar Abdul Hamid: 1D analytical solution of polymer slug injection with viscous fingering
9:58	Esther Rosenbrand: DGFlow: modelling backward erosion piping using a finite element code
10:16	Adam Bezuijen: Backward erosion piping: grain pore water flow interaction on different scales
10:34	Mohammad Parvazdavani: Experimental and modeling study of the effect of pore size distribution on mechanical formation damage in water injection
9:20 - 10:50	Parallel session-1: Room 3 MS1.3: <i>Fluids in Nanoporous Media</i> Chairs: G. Gor and P. Huber
9:20	Session opening
9:22	Simone Mascotto: Comprehensive characterization of disordered nanoporous materials combining gas physisorption with scattering methods
9:40	Ali Beskok: Water transport through anodic aluminum oxide nano-porous membranes
9:58	Amaël Obliger: Transport of Hydrocarbons Mixtures in Shales Subnanoporous Matrix
10:16	Elizabeth Barsotti: Selective adsorptivity and capillary condensation of multicomponent gases as a consequence of experimental technique
10:34	Pierre-Louis Valdenaire: Coupling between hydrocarbons recovery and elastic relaxation inside Kerogen's nanoporosity

9:20 - 10:50	Parallel session-1: Room 4 MS1.5: Constitutive framework for unsaturated porous media: experimental challenges and modeling opportunities Chairs: E. Nikoosaei, F. Casini, S. Ghabezloo, T. Schanz and J. Vaunat
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Jerome Duriez: Micro-mechanical analysis of an effective stress variable for wet granular media Marius Milatz: Experimental investigations on the role of transient effects within the drying-wetting behaviour of two different sands Mateusz Wyrzykowski: Shrinkage of concrete as an effect of hygro-mechanical coupling in unsaturated porous body – experimental and theoretical study of different poroelastic approaches Marcos Samudio: Elastoplasticity of unsaturated evolving porous media: application to cement paste hydration Arash Azizi: Effects of repeated hydraulic loads on the hydromechanical response of an unsaturated silty soil
9:20 - 10:50	Parallel session-1: Room 5 MS1.6: Pore Scale Processes and Upscaling of Flow and (Reactive) Transport in Porous Media Chairs: A. Raouf, T. Bultreys, E. de Vries and V. Cnudde
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Gaute Lindkvist: Multiscale lattice Boltzmann modelling of transport properties in porous media Abdolreza Kharaghani: On the upscaling of the velocity in a slowly drying porous medium from pore network simulations Ryan Armstrong: Flow in Coal Seams: An Unconventional Challenge Charlotte Garing: Pore-scale investigations into the stability of residual CO ₂ Sangeetha CJ: A pore-scale evaluation of bacterial mediated transformation of toxic Cr (VI) to Cr (III) by using real-time electrical capacitance method
9:20 - 10:50	Parallel session-1: Room 6 MS2.8: Challenges in modelling of capillary dominated flow in porous media Chairs: Y. Zhou, J. Cai and R. van Dijk
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Daolun Li: Pressure transient analysis in low permeability reservoir with pseudo threshold pressure gradient Jianchao Cai: A model for spontaneous imbibition in porous media with pore shape and tortuosity considered Johan Olav Helland: Pore-scale simulation of three-phase gas and water invasion processes on 3D rock images Saideep Pavuluri: Direct Numerical Simulation of capillary dominated flows using the Volume of Fluid method Dmytro Petrovskyy: Capillary entry conditions for pore cross-sections with arbitrary geometry and wettability
9:20 - 10:50	Parallel session-1: Room 7 MS2.23: Novel approaches for modeling reactive flows Chairs: A. Paster, D. Bolster and D. Benson
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Nicholas Engdahl: Simulation of complex geochemistry in the Lagrangian reference frame Amir Paster: Modeling heterogeneous reaction by random walk simulation Marco Dentz: Fluid stretching in heterogeneous porous media as a coupled continuous time random walk Maryam Rahbaralam: Modeling of adsorption with particle tracking and kernel density estimators Ilenia Battiato: Multiscale methods for unresolved pore-scale heterogeneous samples
9:20 - 10:50	Parallel session-1: Room 8 MS2.25: Coupled charge migration and diffusion processes Chairs: N. Klitzsch, M. Ecker and J. Liu
9:20 9:22 9:40 9:58 10:16 10:34	Session opening Michele Tedesco: Ion transport in weakly charged porous media and ion exchange membranes for shock electro dialysis desalination Tien Dung Le: Multi-scale modeling of diffusion and electrochemical reaction for porous micro-electrodes Vahid Niasar: Nonmonotonic Pressure Field Induced by Ionic Diffusion in Charged Thin Films Uddipta Ghosh: Coupled charge migration and fluid mixing in reactive fronts Muhammad Muniruzzaman: Modeling multicomponent ionic dispersion, electrochemical migration, and chemical reactions in porous media with IPhreeqc coupling

Parallel session-2

11:20 - 12:50	Parallel session-2: Room 1 MS2.28: Pore-Scale Modeling and Experiments on Multiphase Flow in Porous Media Chairs: P. Kunz, B. Guo, M. Hirschler, C. Qin and U. Tuttlies
11:20	Session opening
11:22	TieJun Zhang: Mechanism of Pore-scale Oil Displacement under Water-Alternating-Gas Injection
11:40	Martin Brinkmann: Evolution of Invading Fluids Fronts at Different Wetting Conditions
11:58	Santanu Sinha: Effective Rheology of Two-phase Flow in 3D Porous Media: Experiment and Simulation
12:16	Thomas Hiller: Stochastic Rotation Dynamics simulations of wetting multi-phase flows in porous media
12:34	Nikolay Evseev: Modelling of microemulsions by density functional hydrodynamics
11:20 - 12:50	Parallel session-2: Room 2 MS4.12: Experimental and Modelling Techniques for the Investigation of Fundamentals of Enhanced Oil Recovery Methods Chairs: N. Karadimitriou, V. Joekar-Niasar and H. Mahani
11:20	Session opening
11:22	Sophie Roman: Experimental investigation of dissipative processes during two-phase flows
11:40	Rimsha Aziz: Transport and mixing of low salinity water flooding in porous media under two phase flow conditions
11:58	Saman Aryana: The impact of heterogeneities on CO ₂ foam flow behavior in a microfluidic device
12:16	Vahideh Mirchi: Micro-scale experimental investigation of the impact of surfactant structure on the residual trapping of non-wetting phase in natural porous media
12:34	Tannaz Pak: Nanoparticle-enhanced immiscible fluid displacement in porous rocks
11:20 - 12:50	Parallel session-2: Room 3 MS1.3: Fluids in Nanoporous Media Chairs: G. Gor and P. Huber
11:20	Session opening
11:22	Guillaume Galliero: Simple fluids confined in nano-slits: from local transport properties to shear-swelling couplings
11:40	Klaus Schappert: Impact of temperature on the sorption-induced deformation of nanoporous glass
11:58	Edmond (Tingtao) Zhou: Density functional predictions for sorption isotherms and drying shrinkage of multi-scale porous structures
12:16	Bogdan Kuchta: Structural transformations of methane adsorbed in nano-pores
12:34	Patrick Bonnaud: Prediction with molecular simulations of the macroscopic linear strain induced by the water content in cement nanopores
11:20 - 12:50	Parallel session-2: Room 4 MS1.5: Constitutive framework for unsaturated porous media: experimental challenges and modeling opportunities Chairs: E. Nikoosaei, F. Casini, S. Ghabezloo, T. Schanz and J. Vaunat
11:20	Session opening
11:22	Arman Khoshghalb: A model for evolution of soil water retention curve with void ratio using energy considerations
11:40	Martinus van Genuchten: Detailed tests of the HYPROP evaporation method for estimating the unsaturated soil hydraulic properties
11:58	Kartal Tokar: Elasto-Plastic Behavior of an Unsaturated Compacted Non-Plastic Silt
12:16	Julia Mainka: On the role of nanoscopic disjoining stresses in the overall stiffness of expansive clays – a multi-scale approach
12:34	Bruno Chareyre: Effective stress versus elastic deformations: a numerical investigation
11:20 - 12:50	Parallel session-2: Room 5 MS1.6: Pore Scale Processes and Upscaling of Flow and (Reactive) Transport in Porous Media Chairs: A. Raouf, T. Bultreys, E. de Vries and V. Cnudde
11:20	Session opening
11:22	Dorthe Wildenschild: Exploring unsaturated colloid deposition and mobilization in 3D with x-ray microtomography
11:40	Hannah Menke: 4D XMT of reaction in carbonates: Reactive transport dynamics at multiples scales
11:58	Eleonora Crevacore: The role of recirculation zones on non-Fickian transport phenomena in 3D porous media
12:16	Rodolfo Oliveira: Absolute permeability estimation using smoothed particle hydrodynamics
12:34	Emmanuel LE TRONG: A scalable, modular pore network model

11:20 - 12:50	Parallel session-2: Room 6 MS3.5: X-ray Micro-tomography of Snow and Porous Ice Media Chairs: S. Maus and F. Enzmann
11:20	Session opening
11:22	Frederic Flin: Snow isothermal metamorphism: in situ experiment, measurement of interfacial velocities and phase-field modeling for a better understanding of the involved mechanisms
11:40	Tim De Kock: Ice crystallization in porous rock: the use of X-ray micro-tomography, aims and challenges
11:58	Ross Lieb-Lappen: Analyzing brine channel morphology in sea ice using x-ray micro-computed tomography
12:16	Alexis Burr: Densification of Antarctica firn by oedometer test under X-Ray micro-tomography
12:34	Xiaoyu Dai: Radiative characterization of morphologically complex multi-scale media - Application to snow with agglomerated soot impurities
11:20 - 12:50	Parallel session-2: Room 7 MS2.14: Mixing and reaction in permeable media from pore to continuum scale Chairs: B. Bijeljic and M. Dentz
11:20	Session opening
11:22	Yousef Al-khulaifi: Dynamic imaging of reaction at reservoir conditions - the impact of chemical and physical heterogeneity in carbonates
11:40	Juan J. Hidalgo: Role of stagnation points in the mixing dynamics of unstable flow systems
11:58	Daniel Meyer: Towards relating pore-scale geometry with emerging macro-scale transport
12:16	Massimo Rolle: Impact of compound-specific mixing and electrostatic interactions on transient transport and solute breakthrough
12:34	John Cushman: Redox reactions in immiscible-fluids in porous media---Membraneless battery applications
11:20 - 12:50	Parallel session-2: Room 8 MS2.26: Shale and Tight Reservoirs; Pore-Level Simulation Challenges Chairs: Cedric Gommès, Arman Khoshghalb
11:20	Session opening
11:22	Sahand Etemad: Effect of steam temperature and injection rate on SAGD performance
11:40	Siarhei Khirevich: Voronoi tessellation-based generation of three-dimensional fractured geometry and determination of its transport properties using pore-scale simulations
11:58	Banafsheh Goudarzi: Effects of rock configuration and image resolution on pore-scale petrophysical characteristics
12:16	Markus Peltz: Permeability anisotropy determined from 3D nano-scale pore structures of organic-rich shales
12:34	Apostolos Kantzas: Measurement of Tight Formation Transport Properties : a Sub-Pore Scale Approach
Invited speakers	
14:00 - 14:30	Invited speaker: Room 1 Iryna Zenyuk: Understanding transport processes in thin porous electrodes of electrochemical devices via X-ray computed tomography Chair: Peyman Mostaghimi
14:00 - 14:30	Invited speaker: Room 2 Thomas Nagel: Porous media in the energy sector: Applications and software development Chair: Maria Elenius
14:00 - 14:30	Invited speaker: Room 3 Nasser Khalili: Dynamic analysis of unsaturated porous media including hydraulic hysteresis Chair: Matthew Jackson
14:00 - 14:30	Invited speaker: Room 4 Jeffrey Gostick: Multiphysics modeling of electrodes with pore networks Chair: Felipe Pereira

Poster pitch presentation session

<p>14:40 - 15:40</p>	<p>Poster pitch presentation session: Room 1 GS2 [MS2.10+MS2.11+MS2.14+MS2.20+MS2.26] Chairs: Sven Linden, Yaoming Mu, Emmanuel Keita</p>																								
	<table border="0"> <tr> <td>14:40 Session opening</td> <td></td> <td></td> </tr> <tr> <td>14:42 XRE</td> <td>15:02 Rebecca Liyanage</td> <td>15:23 Torben Prill</td> </tr> <tr> <td>14:45 Kasparas Spokas</td> <td>15:05 Alexandre Puyguiraud</td> <td>15:26 Pierre Carrere</td> </tr> <tr> <td>14:48 Christian Hinz</td> <td>15:08 Sebastian Most</td> <td>15:29 Rui Wu</td> </tr> <tr> <td>14:51 Jeff Gostick</td> <td>15:11 Vivien Hakoun</td> <td></td> </tr> <tr> <td>14:53 Ali Qaseminejad Raeini</td> <td>15:14 Ravid Rosenzweig</td> <td></td> </tr> <tr> <td>14:56 Alessandro Comolli</td> <td>15:17 Elise Wright</td> <td></td> </tr> <tr> <td>14:59 Takeshi Kurotori</td> <td>15:20 Martin Hasal</td> <td></td> </tr> </table>	14:40 Session opening			14:42 XRE	15:02 Rebecca Liyanage	15:23 Torben Prill	14:45 Kasparas Spokas	15:05 Alexandre Puyguiraud	15:26 Pierre Carrere	14:48 Christian Hinz	15:08 Sebastian Most	15:29 Rui Wu	14:51 Jeff Gostick	15:11 Vivien Hakoun		14:53 Ali Qaseminejad Raeini	15:14 Ravid Rosenzweig		14:56 Alessandro Comolli	15:17 Elise Wright		14:59 Takeshi Kurotori	15:20 Martin Hasal	
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<p>14:40 - 15:40</p>	<p>Poster pitch presentation session: Room 2 GS2 [MS2.1+MS2.2+MS2.16+MS2.28+MS2.9+MS2.30] Chairs: Ivan Lunati, Johan Olav Helland</p>																								
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Parallel session-3

16:45 - 18:15	Parallel session-3: Room 1 MS2.28: Pore-Scale Modeling and Experiments on Multiphase Flow in Porous Media Chairs: P. Kunz, B. Guo, M. Hirschler, C. Qin and U. Tuttlies
16:45 16:47	Session opening Joyce Schmatz: Probabilistic reconstruction of the 3D contact angle of two-phase fluid interfaces in porous media from a high-resolution 2D Cryo-BIB-SEM data
17:05	Philip Kunz: SiPER - SPH in Porous Media: State and Perspectives
17:23	Irina Sin: Adaptive unstructured-gridding and fluid-flow property computations on segmented images of porous media
17:41	Chaozhong Qin: Two-phase flow through thin porous layers: beyond extended Darcy's law
17:59	Matthew Andrew: Multiscale characterization of a mixed wet carbonate using X-ray microscopy. Extending pore scale techniques to the whole core scale
16:45 - 18:15	Parallel session-3: Room 2 MS1.5: Constitutive framework for unsaturated porous media: experimental challenges and modeling opportunities Chairs: E. Nikoee, F. Casini, S. Ghabezloo, T. Schanz and J. Vaunat
16:45 16:47	Session opening Abhishek Rawat: Transient Hydration of Compacted Bentonite Based Buffer Material in Under Ground Disposal of Nuclear Waste: Challenges and Experimental Investigations
17:05	Laura Gonzalez-Blanco: Pathway development and connectivity during gas injection / dissipation tests: Experimental results and numerical modelling
17:23	Ehsan Nikoee: Determination of fluid-fluid interfaces in unsaturated soils: the current key challenges
17:41	Jean Vaunat: A model for retention curve in materials with evolving pore size distribution
17:59	Bizhan Zangiabadi: Challenges of experimental and modelling hydro-chemo-mechanical mechanisms in porous chalk reservoirs during production operation
16:45 - 18:15	Parallel session-3: Room 3 MS1.7: Non-linear Flows in Porous Media: Non-Newtonian Fluids, Inertia Effects, Slip ... Chairs: M. Quintard, D. Lasseux and Y. Davit
16:45 16:47	Session opening Dimetre Triadis: Boundary interface effects on anomalous dispersion in simulated two-phase porous media flow with upscaled correlated continuous time random walk modelling
17:05	Steffen Berg: Pore scale flow fields and shear rate for sandstone rock in comparison to model geometries
17:23	Maude Ferrari: Dispersion for non-Newtonian fluids using NMR techniques: comparison between Taylor dispersion in a tube and porous media
17:41	Maxime Berg: Non-linear transport phenomena in brain microvascular networks
17:59	Britta Schoesser: Experimental investigation and numerical simulation of non-Newtonian flow of bentonite suspension through porous media based on a pore space description gained from μ CT analysis
16:45 - 18:15	Parallel session-3: Room 4 MS2.11: Advances in Pore Network Modeling: Multiscale and Multiphysics Modeling of Non-Conventional Porous Materials Chairs: J. Gostick and M. Prodanovic
16:45 16:47	Session opening Mohamed Regaieg: An adaptive pore network model to characterize the flow regime domains for several rocks
17:05	Leonardo Ruspini: Multiscale pore network modelling of imbibition: scanning curves and wettability change modelling
17:23	Karim Khayrat: Multiscale pore network method for unstructured networks
17:41	Hang Liu: Investigating transport phenomena in polymer electrolyte membrane fuel cell bilayered gas diffusion layers using pore network modeling
17:59	Chung Lee: A microfluidic investigation on the impact of porous media structure on bubble fingering
16:45 - 18:15	Parallel session-3: Room 5 MS2.14: Mixing and reaction in permeable media from pore to continuum scale Chairs: B. Bijeljic and M. Dentz
16:45 16:47	Session opening Anne De Wit: Effect of chemical reactions on CO ₂ sequestration: an experimental approach
17:05	Diogo Bolster: Upscaling of dilution and mixing using a trajectory based Spatial Markov random walk model
17:23	Giulia Ceriotti: Characterization of a double-continuum formulation for mixing-driven reactions through pore-scale information
17:41	Piotr Szymczak: The growth of wormholing zone in a dissolving porous medium
17:59	Joris Heyman: Experimental characterization of fluid stretching in porous micromodels

16:45 - 18:15	Parallel session-3: Room 6 MS2.10: Advances in Two-Phase Flow Simulations Chairs: A. Wiegmann and S. Linden
16:45 16:47 17:05 17:23 17:41 17:59	Session opening Dong Yang: The chaotic gas-liquid two-phase flow in single fracture and its mechanism Ahmed Jarray: Wet granular flow control in a rotating drum Sven Linden: Pore Morphology Method with Hysteresis Effect for Enhance Oil Recovery Applications Jakub Solovský: Multidimensional exact solutions for two-phase flow in porous media Lorenz Holzer: Anisotropic breakthrough and relative permeability in fibrous gas diffusion layers: Insight from X-ray tomography and pore morphology modeling
16:45 - 18:15	Parallel session-3: Room 7 MS4.12: Experimental and Modelling Techniques for the Investigation of Fundamentals of Enhanced Oil Recovery Methods Chairs: N. Karadimitriou, V. Joekar-Niasar and H. Mahani
16:45 16:47 17:05 17:23 17:41 17:59	Session opening Camilo Franco: Nanotechnology effect on the rheology of heavy crude oil and its mobility on porous media at reservoir conditions Ying Jia: The Vapour-vapour Interphase Observation and Simulation of a Gas-Condensate/ Supercritical CO2 system Marise J.E. Westbroek: Path Integral Method for Flow through Random Porous Media Mieczysław Cieszko: Description of Quasi Static and Quasi Stationary Processes of Capillary Transport of Liquid in Unsaturated Porous Materials Huanhuan Tian: Contribution of electrical double layer repulsion to wettability alteration: from pore scale to molecular scale



Rotterdam, city life

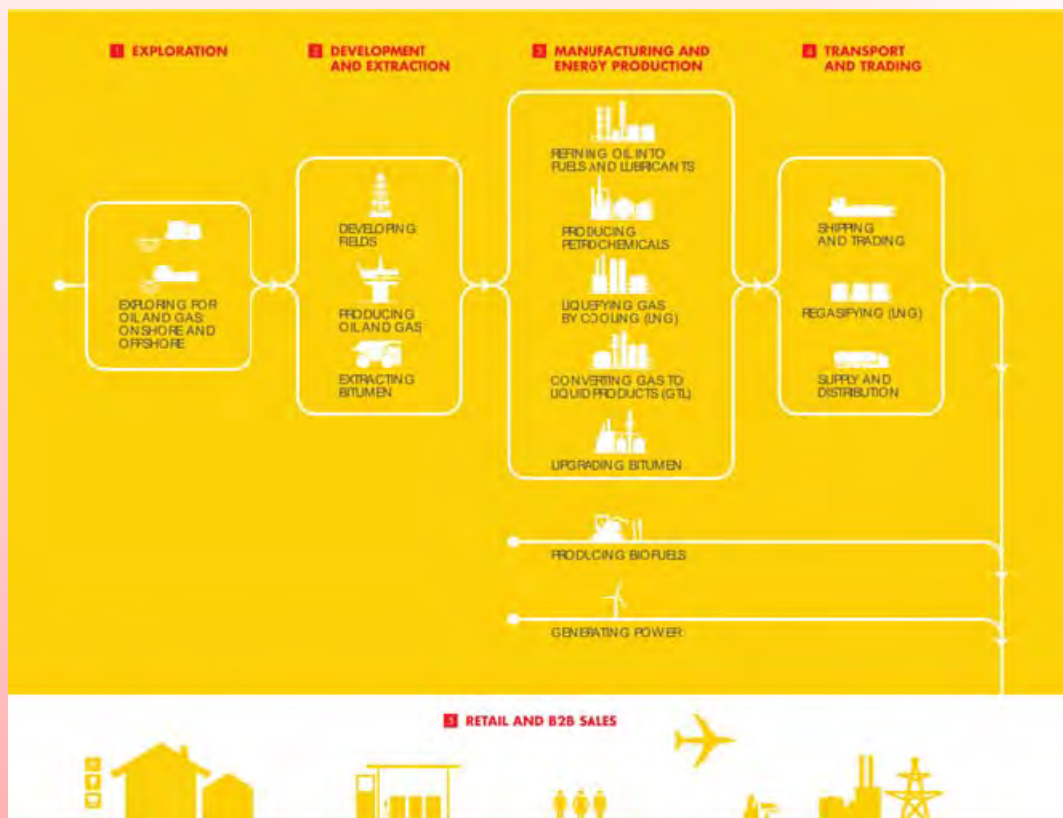


Shell

Shell Corporate Profile



We find and extract crude oil, natural gas and bitumen, and transform them into products for sale to retail and commercial customers. We provide gas for cooking, heating and electrical power, fuels and lubricants for transport, and chemical products for plastics, coatings, detergents and many other applications.



UPSTREAM 2014 HIGHLIGHTS

- 3.1 million boe/d production
- 24.0 million tonnes of LNG sold
- \$15.8 billion earnings
- \$31.8 billion cash flow operations
- 10 frontier and heartlands discoveries and successful appraisals
- 3 final investment decisions on key projects
- 4 production start-ups of operated deep-water projects

Upstream explores for and recovers crude oil, natural gas and natural gas liquids, liquefies and transports gas, and operates the upstream and midstream infrastructure necessary to deliver oil and gas to market. Upstream is managed as two businesses: Upstream International and Upstream Americas.

DOWNSTREAM 2014 HIGHLIGHTS

- 6.4 million b/d oil products
- \$ 3.4 billion CCS earnings
- \$ 11.3 billion cash flow from operations
- 43 thousand branded retail sites in more than 70 countries
- 85% chemical plant and highest ever refinery availability during a year, 94%

Downstream manages Shell's refining and marketing activities for oil products and chemicals. These activities are organized into globally managed classes of business, although some are managed regionally or provided through support units.

PROJECTS & TECHNOLOGY KEY STRENGTHS

- Innovation and R&D
- Technology solutions and deployment
- Project execution

Projects & Technology manages the delivery of Shell's major projects and drives the research and innovation to create technology solutions. It is also responsible for branding functional leadership across Shell in the areas of safety and environment, and contracting and procurement.

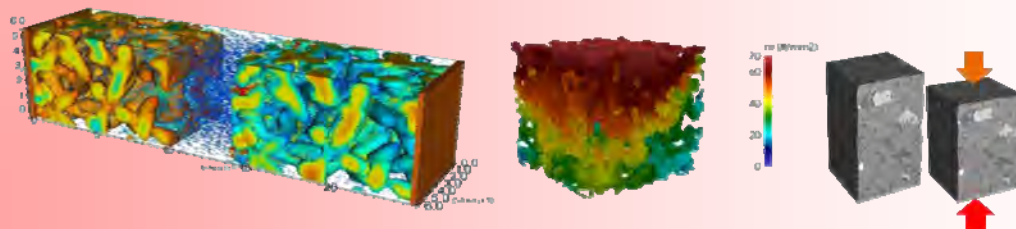
Fraunhofer-Institut für Techno- und Wirtschaftsmathematik

Fraunhofer ITWM in Kaiserslautern focuses on the development of mathematical applications for industry, technology and economy. Mathematical approaches to practical challenges are the specific competences of the institute and complement knowledge in engineering and economics in an optimal way. In 2001 ITWM became the first mathematical oriented institute of the Fraunhofer Gesellschaft. Nowadays, Fraunhofer ITWM is the world-largest institute for industrial mathematics.

The core competence of Fraunhofer ITWM is mathematics: the language used by scientists and engineers to formulate models for technical systems, for environmental and biomedical processes and materials. In our time it is particularly important, as it provides efficient algorithms to compute and analyse such models.

The ITWM 's mission is to develop this technology, to give innovative impulses and put them into practice together with industry partners. Since its foundation in 1995 the ITWM has shown great success in building mathematical bridges between applied sciences and concrete application. Clients are large international companies as well as small and medium regional enterprises.

Multiscale modelling is a strategic issue at the ITWM since processes in porous media and composite materials, as well as production, processing and performance of materials in technological applications tend to depend on the interplay between scales. Homogenization, up-scaling, model reduction and model coupling are a focus of the research activities at the ITWM. Techniques like image processing, molecular dynamics simulations, numerical up-scaling of transport and reaction properties depending on microstructure, algorithms for coupled multiscale models, linear and nonlinear micro-mechanical analysis, etc, are core activities. The application areas include water purification, soil pollution, catalytic filters, Digital Rock Physics, electrochemical processes in porous electrodes, computer aided filtration processes engineering, composite materials, paper manufacturing, technical textiles, and many others. One essential outcome of ITWM's work are customized software tools for performing multiscale simulations. Math2Market with the software product GeoDict is one successful spin-off of Fraunhofer ITWM



Procter & Gamble



Our Purpose:

We will provide branded products and services of superior quality and value that improve the lives of the world's consumers, now and for generations to come. As a result, consumers will reward us with leadership sales, profit and value creation, allowing our people, our shareholders, and the communities in which we live and work to prosper.

Our Promise:

P&G touches and improves the lives of billions of people around the world. And P&G people work to make sure those brands live up to their promise to make everyday life just a little bit better, now and for generations to come.

P&G at a Glance:

- Countries of Operations: ~70
- Countries Where Our Brands Are Sold: 180+
- Sales: \$65.3 billion



Core Strengths:

Consumer Understanding; Go-to-Market; Brand-Building; Scale; Innovation; Productivity

Innovation:

- Innovation is core to driving the long-term growth of our business
- We invest more in innovation than any other company in our industry (\$2 billion)
- Over 7,500 R&D employees worldwide
- Over 40,000 active patents
- Through innovation we fulfill our purpose to improve the consumers' lives, looking carefully for sustainability opportunities at every touch point along our products' development path. We do this by developing new materials, packaging innovations and alternative energy programs that allow us to deliver more sustainable products. Also, we leverage on cutting edge technologies such as virtual modeling and simulation tools to maximize our efficiency
- Innovation work covers product research, product development, process development and manufacturing capability, packaging development, analytical & microbiology, product safety & regulatory affairs, etc.
- If you are interested to career opportunities in P&G R&D, please visit <http://germany-austria.pgcareers.com/> for more information and online application.



Kimberly-Clark



Kimberly-Clark

Leading the World in Essentials for a Better Life

Our Global Businesses and Brands

Kimberly-Clark is headquartered in Dallas, Texas with approximately 43,000 employees worldwide and operations in 35 countries. K-C's global brands, including five billion-dollar brands, are sold in more than 175 countries.



PERSONAL CARE

- Diapers
- Training/Youth/Swim Pants
- Infant and Child Wipes
- Feminine Care
- Incontinence Care



CONSUMER TISSUE

- Facial Tissue
- Bathroom Tissue
- Paper Towels



K-C PROFESSIONAL

- Facial Tissue, Bathroom Tissue and Paper Towels for away-from-home use
- Wipers
- Safety Products



Innovation:

For more than a century Kimberly-Clark has been transforming insights and technologies into innovative products and services that improve the lives of nearly a quarter of the world's population. Our history of innovation began with our founders who established a culture that encouraged entrepreneurial spirit, experimentation in product development and creativity in marketing. As Kimberly-Clark grew, so did our reputation as a company that turns ideas into beneficial realities for our customers, shoppers and users.

Our passion for creating essentials for a better life for people everywhere has driven us to invent five of our eight major consumer product categories: facial tissue, paper towels, toilet paper on a roll, feminine pads and disposable training pants. Kimberly-Clark ranks among the top 5 consumer product companies with 20,000 global patents.

Our innovations will continue as we strive to become more responsive to our customers, shoppers and users' unmet and anticipated needs. Every day we explore new and innovative ways to increase our speed-to-market with new-to-the-world product solutions, to develop and acquire new technologies and to leverage strategic partnerships and alliances to help us create total health and hygiene solutions.



Multiscale Laboratory for Porous Media

- Design and construction of micromodels with prescribed pore geometry; pore dimensions ranging from a few microns to a few millimeters. Micromodels are currently fabricated from PDMS in our own class 10.000 **clean room**.
- Visualization of flow of immiscible fluids and motion of nano- and micron-sized particles in nano and micro-structures, and 3-D imaging of porous structures such as paper, fuel cell layers and beds of swelling particles using our **Confocal Laser Microscope**.
- Visualization of flow of immiscible fluids and solute transport in microstructures using **single or multi-camera open microscope setups** designed and developed in our own laboratory.
- Noninvasive measurement of soil moisture and saturation of fluids using our state-of-the-art **dual energy gamma system** in sand boxes and soil columns.
- Characterization of hydraulic properties of soil and porous structures using in-house made setups, Hydroprop, and pore-scale models
- We have a rich collections of in-house developed software packages, which can perform virtual experiments using our complex **pore-network models** and **grain-scale models**.
- Experience in the application of models used in fluid-dynamics and porous media



Nikon A1R confocal microscope



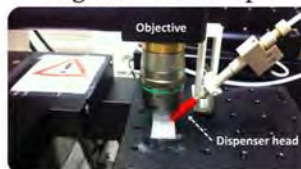
Single camera set-up



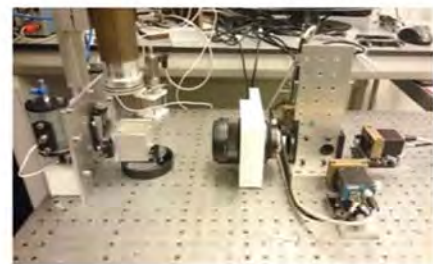
Gamma ray system



Class 10.000 clean room



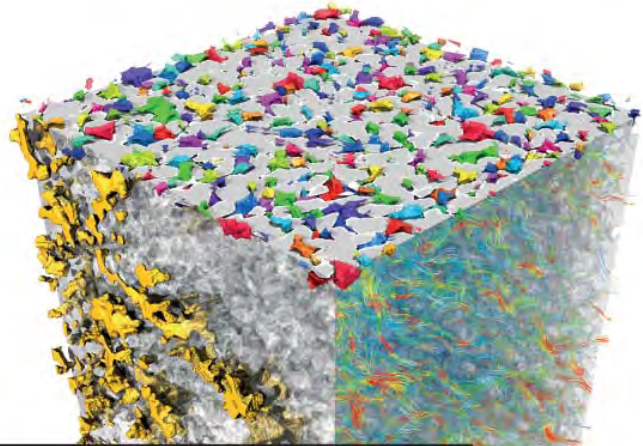
Droplet dispenser setup



Multi-camera set-up



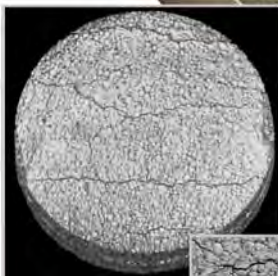
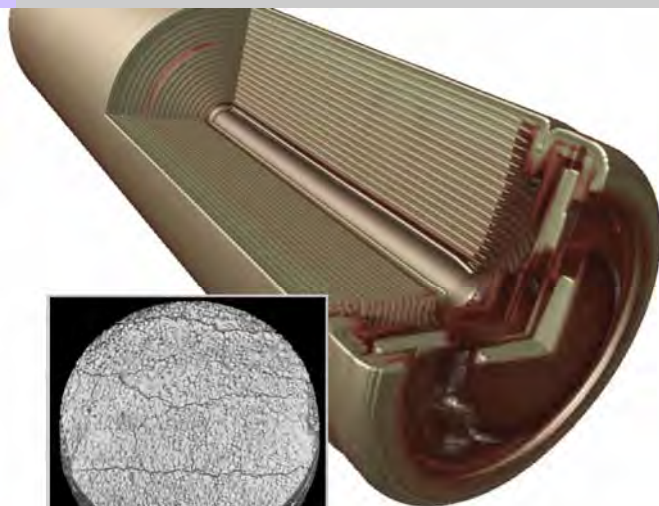
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100 μm



30 μm



10 μm

Understanding pore-scale processes from cm-to-nm scale

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NOTES





InterPore 10th Annual Meeting and Jubilee
May 14–17 2018
New Orleans, USA



Shell



Universiteit Utrecht



Topics and Applications

Transport phenomena
Mathematical and computational modeling
Interfacial behavior and multiphase flow
Multiscale and multiphysics processes
Experimental advances
Imaging, microscopy, and micromodels
Swelling porous media
Nanoporous materials
Reservoir simulation
Groundwater hydrology
Geomechanics and fractured materials
Soil mechanics and engineering
Pore-scale modeling and upscaling
Reactive flows
Wave propagation
Filters and Membranes
Fibers, wood, paper, and textiles
Cements and construction materials
Food and consumer products
Biofilms, bone, & tissue
Biotechnology
Geothermal energy
CO₂ sequestration
Composites and foams
Fuel cells and batteries
Novel porous media applications

Venue and City

The technical program will be held at the New Orleans Morial Convention Center. Three conference hotels are located across the street in the Arts and Warehouse districts. Attractions such as the French Quarter and Riverwalk are within walking distance, while the Garden district and Tulane University can be accessed by streetcar. Flights to New Orleans are from all major U.S. hubs and select international cities. Plan to join us for the Jubilee meeting celebrating ten years of Interpore, while enjoying the music, food, nightlife, and hospitality in one of the most unique cities in North America.

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Clint Willson
Ipsita Gupta
Kyriakos Papadopoulos
Andrea Donmyer (coordinator)

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Background photo courtesy of New Orleans CVB