Workshop on Ion conducting ceramic electrochemical devices: how interfaces and surfaces affect performance and lifetime

The nationally coordinated Nano2021 project "**FOXCET: Functional oxides for clean energy technologies: fuel cells, gas separation membranes and electrolysers**" and the M-ERANET project **"SURKINOX: Designing rules for enhancing surface kinetics in functional oxides for clean energy technologies**" are organizing a workshop focusing on proton and oxide ion conducting ceramic materials in electrochemical devices such as fuel cells, electrolysers, electrochemical pumps and reactors, and membranes.

The workshop addresses some of the following questions:

- How surfaces and interfaces affect performance and lifetime?
- What is the current progress in scaling up of these technologies?

Time: **19-20th April 2018**

Location: Oslo Science Park (Forskningsparken)

Gaustadalléen 21 N-0349 Oslo

Room: Hagen 1-2

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19 April 2018	Agenda
09:30 – 10:00	*Registration and coffee*
10:00 – 10:15	Welcome and introduction of the workshop
10:15 – 12:15	**Session 1: Electrodes of proton ceramic fuel cells and electrolysers Chair: Truls Norby**
10:15 – 10:45	Rotraut Merkle, Max Planck Institute For Solid State Research *Protons in PCFC cathode materials - bulk defect chemistry and implications for the surface reaction*
10:45 – 11:05	Carlos Bernuy-López, Sandvik *Structural and chemical parameters affecting the performance of LaBaCo2O5+d as a cathode for Proton Ceramic Fuel Cells*
11:05 – 11:25	Laura Rioja-Monllor, Norwegian University of Science and Technology (NTNU) *Effect of the microstructure on the electrochemical performance of $La_{0.5}Ba_{0.5}CoO_{3-\delta}$ - $BaZr_{1-z}Y_zO_{3-\delta}$ (z = 0 and 0.1) PCFC cathodes.*
11:25 – 11:45	Ragnar Strandbakke, University of Oslo *A brief overview of Electrodes for Proton Ceramic Electrolysers – Desired Properties, Current Status and Future Outlook*
11:45 – 12:15	Discussion between presenters and participants
12:15 – 13:15	*Lunch*
13:15 – 15:35	**Session 2: Surface kinetics Chair: Zuoan Li**
13:15 – 13:25	Zuoan Li, SINTEF *The SURKINOX project*
13:25 – 13:55	Jose Santiso, Catalan Institute of Nanoscience and Nanotechnology, ICN2 *Time-resolved X-ray diffraction for Oxygen Surface Exchange determination*
13:55 – 14:15	Tor Bjørheim, University of Oslo *Oxygen exchange kinetics of $CaTi_{0.9}Fe_{0.1}O_{3-\delta}$ by means of isotope exchange and transient techniques*
14:15 – 14:35	*Break*
14:35 – 14:55	Zainab Aman, University of Twente *Measuring oxygen surface exchange on mixed ionic-electronic conducting oxides by pulse isotopic exchange*
14:55 – 15:15	Jonathan Polfus, SINTEF *Interplay between H_2O/CO_2 co-adsorption and space-charge on Y-doped $BaZrO_3$ surfaces*
15:15 – 15:35	Discussion between presenters and participants

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15:35 – 17:20	**Session 3: Space charges and interfaces Chair: Rune Bredesen**
15:35 – 16:05	Göran Wahnström, Chalmers *The space-charge effect: insights from first-principles modelling*
16:05 – 16:25	Ida Hasle, University of Oslo *Study of Cation Diffusion in BaZrO3 by Experimental and Computational Approaches*
16:25 – 16:45	Truls Norby, University of Oslo *Space-charge and its effects on solid-oxide electrode kinetics*
17:45 – 17:05	Tarjei Bondevik, University of Oslo *Combining machine learning with DFT to determine atomic structures of $BaZrO_3$ grain boundaries*
17:05 – 17:25	Discussion between presenters and participants
18:00	**Dinner at Oslo Science Park**

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20 April 2018	Agenda
08:30 – 8:45	*Coffee*
8:45 – 11:00	**Session 4**: **Up-scaling, lifetime and applications Chair Mari-Ann Einarsrud and Tor Grande**
8:45 – 9:15	Per Kristian Vestre, CoorsTek Membrane Sciences AS *Commercialization of Ceramic Proton Conductors*
9:15 – 9:45	Jose Serra, Agencia Estatal Consejo Superior de Investigaciones Cientificas (CSIC-ITQ) *Catalytic membrane reactors based on ceramic ion-conducting membranes*
9:45 – 10:15	Tor Grande and Mari-Ann Einarsrud, Norwegian University of Science and Technology (NTNU) *Interaction of $BaZrO_3$-based electrolytes with $H_2O(g)$ and $CO_2(g)$*
10:15 – 10:35	*Break*
10:35 – 11:05	Christian Kjølseth, CoorsTek Membrane Sciences AS *Thermo-electrochemical production of compressed hydrogen from methane with near-zero energy loss*
11:05 – 11:25	Rokas Sazinas, Technical University of Denmark (DTU) *Cation diffusion in A(II)B(IV)O3 perovskites*
11:25– 11:45	Marit Stange, SINTEF *Manufacturing of Metal Supported Protonic Ceramic Electrolyser Cells*
11:45 – 12:05	Marie-Laure Fontaine, SINTEF *Development of proton ceramic electrolysers using tubular design*
12:05 – 12:25	Discussion between presenters and participants
12:25 – 12:30	Closing remarks
12:30-13:30	Lunch