SOFC/SOEC MODELING
THURSDAY, NOVEMBER 9 – ROOM 102 B, 3:45 PM - 5:45 PM

- **Accelerated Life Testing and Modeling of SOFC Electrode Degradation Mechanisms** - Scott Barnett, Northwestern University
  - This paper will describe accelerated testing experiments aimed at studying SOFC electrode degradation and providing the information needed to develop models that can predict long-term durability.

- **Model-based approach for analysis of the sensitivity of planar SOEC to selected parameters** - Jakub Kupecki, Institute of Power Engineering
  - Solid oxide cells (SOC) with advanced electrodes offer a great potential for realization of solid oxide electrolyzers (SOEC) and solid oxide fuel cells (SOFC). The unification of both technologies results in a reversible fuel cells (ReSOC or reSOFC). The performance of the cell either in the fuel cell or regenerative mode can be predicted using several modeling approaches which lay in the area of computational fluid dynamic modeling, loss estimated approach, reduced order or lumped volume models. The recent study was oriented at the development and application of a numerical model which aids is investigating the sensitivity of the solid oxide electrolysis cell to several constructional and operating parameters.

- **Modeling of Power-to-Gas and Electric Energy Storage System Based on Solar-assisted Reversible Solid Oxide Cell (rSOC)** - Giulio Guandalini, Politecnico di Milano
  - Coupling with a medium size wind farm (30 MW) and a photovoltaic solar plant are presented as case study, investigating possible BOP integration.

- **Modeling rSOC Coupled with Na-based Heat Pipes for Electrochemical Energy Storage Applications** - Luca Mastropasqua, Politecnico di Milano
  - Reversible electrochemical cells, in particular high temperature Solid Oxide Cells (rSOC), embody advantages in terms of fast electrochemical kinetics and high performance. Their system integration generally requires the coupling with thermal sources and/or storage systems in order to supply the necessary thermal power for reversible operation. The model incorporates the dimensional modelling of the fluid-dynamics and heat and mass transport within the heat pipe.

- **Light Water Reactor Repurposed for H2 Generation by SOEC** - Richard Boardman, Idaho National Laboratory
  - An integrated plant design and the dynamic integration of coupling a Solid-Oxide Electrolysis Cell (SOEC) to a LWR has been modeled with HYSYS and Modelica, respectively. The market feasibility has been assessed using LWR operational costs for a representative plant in the U.S.