UNIVERSITY OF AMSTERDAM

Invitation to A John van Geuns Foundation lecture by

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Intensified catalysis in solid-state electrochemical reactors

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The gas exchange and catalytic pathways on the surface of solid-state devices usually determine the evolution rate, the selectivity towards target reaction products, and the system's stability. Solid-state ionic materials play a vital role in contemporary and future energy technologies, including fuel cells, batteries, and electrolysers. Their application extends beyond these areas, becoming increasingly relevant in the process industry. These materials are crucial for reducing CO_2 emissions by electrifying industrial processes. Electrochemical solid-electrolyte cells enable the creation of catalytic reactor processes that shift chemical equilibria in a favorable direction and facilitate the separation of valuable products. A novel concept involves using microwaves and ceramic ion-conducting cells to drive electrochemically-driven catalytic reactors, requiring selective electrocatalysts to produce specific gas products. For instance, protonic membrane reactors employing ceramic proton conductors like doped $BaZrO_3$ show high chemical stability in carbon-rich environments and excellent proton conductivity, enabling the integration of catalytic reactions and separation in a single step, yielding pressurized H_2. These innovations not only enhance per-pass yield but also improve energy efficiency and catalyst stability, marking a significant advancement in process intensification and sustainability.

If you wish to meet with Prof. Serra, please contact Gadi Rothenberg, g.rothenberg@uva.nl