



Wolfson Department of Chemical Engineering Seminar

Monday, April 11th, 2022 at 13:30

Room #6, Via Zoom: <https://technion.zoom.us/j/97577956516>

Rational Nanoscale Engineering of Thermocatalytic Materials for Sustainable Transformation of CO₂ into Renewable Synthetic Fuels

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Thermocatalytic treatment of CO₂-rich feedstocks (e.g., biogas, landfill gas, industrial flue gases) is an attractive route for generating Renewable Synthetic Fuels. To make the process of thermocatalytic conversion sustainable, hydrogen (H₂), which is required for CO₂ hydrogenation, should have a negligible carbon footprint. This requirement is achievable when H₂ is generated using renewable power (e.g., by water electrolysis). Process development starts with selecting a suitable catalytic formulation, which can be assisted by density function theory (DFT) calculations and machine learning (ML). Once selected, a synthesis method needs to be developed to create the required composition and morphology in a controllable way. Next, transport limitations must be considered at both the micro- and macro-scale. Ultimately, a conversion device (chemical reactor) needs to be designed and integrated into the CO₂ conversion process, which must be assessed for techno-economic feasibility. This talk focuses on the catalyst development, first outlining computational aspects and then discussing the reverse microemulsion system as a synthesis method. Aspects of reactor design, system integration and techno-economic evaluation are briefly outlined as well. Future perspectives are also discussed.