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| הפקולטה להנדסה כימית  ע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, January 13th, 2021 at 13:30**

**Department Seminar**

<https://technion.zoom.us/j/97591164072>

**Understanding catalytic performance through physicochemical gradients on the reactor scale**

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Various types of gradients (temperature, concentration, material state, surface species, etc.) are present in catalytic reactors under continuous operation. For example, when the conversion of a reactant is 90%, the atmosphere a catalyst (e.g. in a packed-bed reactor) experiences is completely different near the fluid inlet or the outlet due to the obvious gradient of the concentration of chemical species in the reaction fluid. This consequently affects the type and concentration of surface chemical species on the catalyst and induces its spatial variation within a reactor. Furthermore, reactions are generally exothermic or endothermic, and even multiple reactions take place simultaneously, inducing temperature gradients in a reactor.

In this talk, I highlight the importance of elucidating such gradients to understand *what* happens *where* for steady-state processes, taking oxidative coupling of methane as an example, and to understand *what* happens *where* and *when* for unsteady-state processes in CO2 conversion and automotive catalysis. Through these examples, I will explain how these gradients can be studied by *operando* methodologies and the outcome (catalytic performance), *i.e.* reactant conversion and product selectivity, is shaped and holistically understood.