



Center for Integrated Catalysis Webinar Series



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What is Integrated Catalysis?

Abstract: Nature uses the architecture of cells to run chemical factories; it combines different processes to construct structurally complex products. Synthetic chemists, in contrast, usually run each chemical reaction individually in a separate vessel, requiring product isolation after each step in the sequence. Integrated catalysis mimics biological systems in the development of synthetic chemical catalytic processes. Simple starting materials should be used to supply networks of multiple catalysts operating together on a single platform, with the aid of temporal and spatial control, to produce new molecules and materials. Integrated catalysis combines spatial and temporal control to enable catalytic processes that allow, for example, the construction of sequence-defined sustainable polymeric materials from simple building blocks. In order to achieve temporal control, switchable catalysts are employed to control polymer composition. Switchable catalysts can be activated or deactivated as needed using external stimuli, such as light or electrochemical potential, enabling control over activity or selectivity; they can also be protected when another reaction is being carried out in the same vessel. In order to achieve spatial control, catalysts are separated through micropatterning and/or controlling local chemical environments. Surface functionalization of precatalysts, along with the development of patterning down to the microscopic scale, will enable catalysis with new reactivity and improved product selectivity. Moreover, potential opto-electronic responses by the underlying materials (e.g., semiconductors) allow tunable reactivity of the active site with external optical or electrical triggers along with the presence of reactant gradients.

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Tuesday, September 22th 2020

1:00 p.m. | ZOOM