Tuesday, April 9, 2019, 12:30 pm
Seaver Science Library, Room 150
SSC Auditorium next to the library

Professor Connie Lu

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Innovating Bimetallic Active Sites for Small-Molecule Catalysis

Discovering a catalyst that is perfectly tailored for a specific reaction is like finding a needle in a haystack. To optimize catalyst discovery, we investigate readily modifiable catalyst systems, for which small changes in structure or property can tune reactivity and/or selectivity. Multimetallic clusters are attractive systems to develop because their electronic properties and reactivity should depend on both the number and composition of the individual metals. The key challenge is to assemble uniform and well-defined multimetallic active sites in molecules and on solid supports. Often, scrambling, agglomeration, and/or other dynamic processes diminish uniformity of metal sites, giving away to complex catalyst speciations that are ill understood.

We have been developing first-row bimetallic complexes for catalysis, where using non-precious metals is sensible from economical and sustainability standpoints. The synergistic combination of different metals could generate hybrid “metals” with original properties and/or unique reactivities. We have investigated pairings of a late transition metal with a Lewis acidic main group ion to tune catalytic activity in activating small molecules, including H_2, N_2, and CO_2. We have also developed the capability to precisely engineer bimetallic active sites on a robust MOF support, where the control over nuclearity and composition are pre-programmed into a bimetallic precursor complex. In both homogeneous and heterogeneous catalysis, the supporting metal plays a pivotal role and can be used to promote both activity and selectivity.

Hosted by Professor Mike Inkpen

The scientific community is invited

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