

## Surface Organometallic Chemistry for Improved Performance and Understanding of Hydrodenitrogenation Catalysis

*Justin M. Notestein, Chemical and Biological Engineering, Northwestern University*

Improved understanding and performance of hydrotreating catalysts is critical to make heavy fuel processing viable. Inspired by intriguing results for bond cleavage by supported and homogeneous Ta and Nb complexes, we have synthesized highly isolated, supported Ta catalysts by a traditional route and by use of a calixarene capping ligand. The calixarene ligand maintains site isolation on the surface. These highly isolated sites are active in hydrodenitrogenation either on their own or in cooperation with metal nanoparticles. The proposed mechanism is by Lewis acidic-activation of denitrogenation intermediates towards direct C-N bond cleavage or deamination, resulting in lower  $H_2$  consumption than for typical catalysts.

