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# Department of Chemistry

## Seminar

9:45 a.m. Thursday, March 13, 2014 • 331 Smith Hall



Professor

**Michael  
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University of Texas at Austin

### Formation of C-C Bonds via Catalytic Hydrogenation and Transfer Hydrogenation

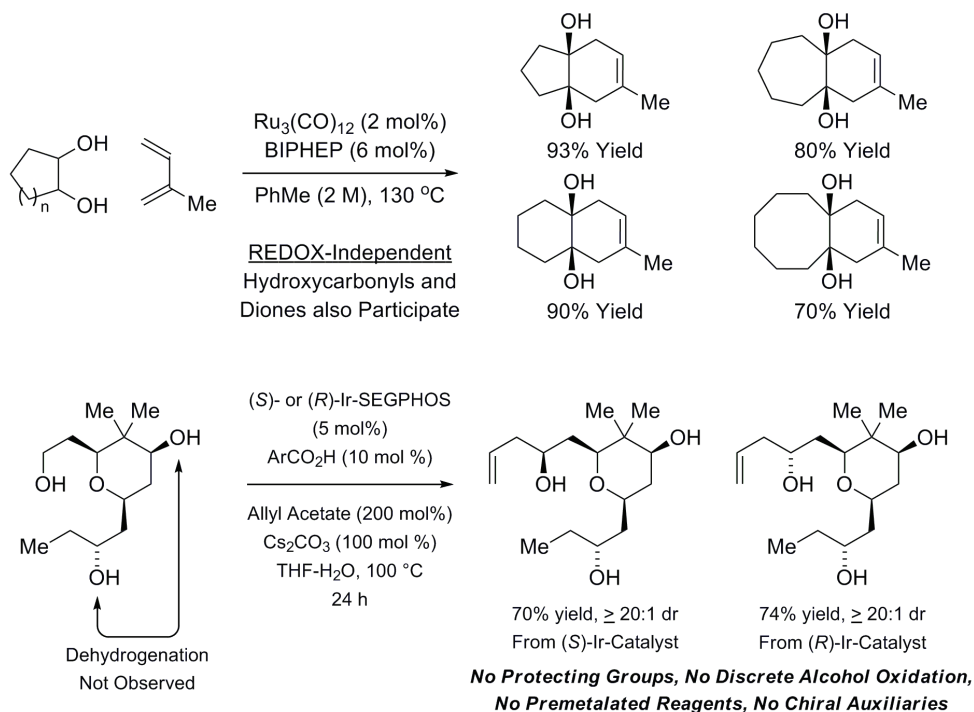
Research interests: first systematic efforts to develop C-C bond forming hydrogenations beyond hydroformylation processes wherein two or more reactants are hydrogenated to form a single, more complex product.

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#### Abstract

We are engaged in the first systematic efforts to develop “C-C bond forming hydrogenations” beyond hydroformylation - processes in which two or more reactants are hydrogenated to form a single, more complex product. Using cationic rhodium and iridium catalysts, diverse  $\pi$ -unsaturated reactants reductively couple to carbonyl compounds and imines under hydrogenation conditions, offering a byproduct-free alternative to stoichiometric organometallics in a range of classical C=X (X = O, NR) addition processes. This concept is extended further via “C-C bond forming transfer hydrogenation.” In such processes, the exchange of hydrogen between alcohols and  $\pi$ -unsaturated reactants triggers the generation of aldehyde-organometal pairs that combine to give products of carbonyl addition. Direct alcohol CH-functionalization in this manner bypasses discrete alcohol-to-aldehyde redox manipulations and is byproduct-free. This new pattern of reactivity enables direct C-C coupling of methanol and other renewable alcohols (ethanol and glycerol) to abundant  $\pi$ -unsaturated reactants ( $\alpha$ -olefins, styrene, butadiene and isoprene) to furnish higher alcohols, and has been used to construct diverse polyketide natural products (bryostatin, roxaticin, 6-deoxy erythronolide).



1. REVIEWS: (a) Bower, J. F.; Krische, M. J. *Top. Organomet. Chem.* **2011**, 43, 107. (b) Hassan, A.; Krische, M. J. *Org. Proc. Res. Devel.* 2011, 15, 1236. (c) Moran, J.; Krische, M. J. *Pure Appl. Chem.* **2012**, 84, 1729.
2. Geary, L. M.; Glasspoole, B. W.; Kim, M. M. Krische, M. J. *J. Am. Chem. Soc.* **2013**, 134, 3796.
3. Dechert-Schmitt, A.-M. R.; Schmitt, D. C.; Krische, M. J. *Angew. Chem. Int. Ed.* **2013**, 52, 3195.

Host: Professor Andrew Harned Refreshments will be served prior to the seminar.