



## 2017-2018 POCC Lecture Series

April 19, 2018, 7:30 PM

### The Student Choice Lecture

Sponsored by the Fox Chase Chemical Diversity Center

**Prof. F. Dean Toste**

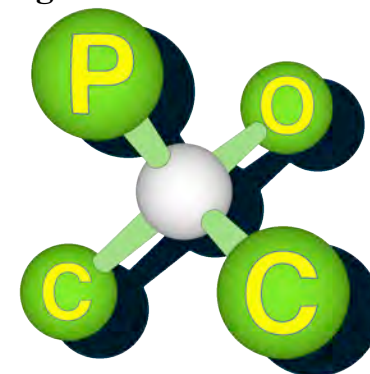
University of California, Berkeley

### *Concepts and Catalysts for Ion-Controlled Reactivity in Organic Synthesis*

Carolyn Hoff Lynch Lecture Hall

Chemistry Building, University of Pennsylvania

The Philadelphia  
Organic Chemist's Club

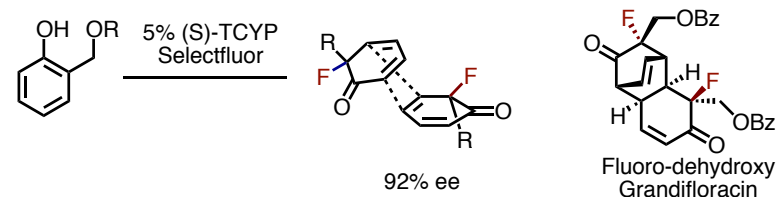


POCClub.org

F. Dean Toste received his B.Sc. and M.Sc. degrees in chemistry from the University of Toronto, Canada and his PhD from Stanford University in 2000. Following postdoctoral studies at Caltech, he joined the faculty at the University of California, Berkeley in July of 2002, and was promoted to Associate Professor in 2006 and Full Professor in 2009. Professor Toste's honors include the Cope Scholar (2006), E.J. Corey (2008) and Creativity in Organic Synthesis (2015) Awards from the American Chemical Society, the Organometallic Chemistry Directed Towards Organic Synthesis (OMCOS) Award (2007) and Thieme-IUPAC Prize in Synthetic Organic Chemistry (2008) from IUPAC, the Merck Award (2010) from the Royal Society of Chemistry, the Mukaiyama Award (2011) from the Society of Synthetic Organic Chemistry Japan and the Horst-Pracejus Prize (2015) from the German Chemical Society.

**Abstract:** The past decade has witnessed remarkable development in the use of cationic gold(I) complexes as homogenous catalysts for the transformation of carbon-carbon  $\pi$ -bonds.<sup>1</sup> Several years ago, we demonstrated that the reactivity of these complexes could be controlled by modification of the counter anion to these cationic transition metal complexes.<sup>2</sup> This discovery provided a general platform for inducing enantioselectivity in reaction not only using cationic transition metal complexes, but also with reactive cationic reagents and intermediates. For example, we have applied this concept towards the development of enantioselective electrophilic fluorination under chiral anion phase transfer conditions (Figure 1).<sup>3</sup> The use of these ionic interactions to control selectivity of cationic species has generally relied on small molecular anions.<sup>4</sup> As an extension of this concept, we have been exploring the use of supramolecular assemblies ( $\text{Ga}_4\text{L}_6$  tetrahedral) as chiral anion for catalysis or as the anionic component in reactions catalyzed by cationic transition metal complexes.<sup>5</sup>

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2. G. A. Hamilton, E. J. Kang, M. M. Blázquez, F. D. Toste, *Science* **2007**, *317*, 496-499
3. (a) V. Rauniar, A. D. Lackner, G. L. Hamilton, F. D. Toste, *Science* **2011**, *334*, 1681-1684. (b) R. J. Phipps, F. D. Toste, *J. Am. Chem. Soc.* **2013**, *135*, 1268-1271.
4. (a) R. J. Phipps, G. L. Hamilton, F. D. Toste, *Nature Chem.* **2012**, *4*, 603-614 (b) A. Milo, A. J. Neel, F. D. Toste, M. S. Sigman, *Science* **2015**, *347*, 737-743.
5. (a) Z. J. Wang, K. N. Clary, R. G. Bergman, K. N. Raymond, F. D. Toste, *Nature Chem.* **2013**, *5*, 100-103. (b) D. M. Kaphan, M. D. Levin, R. G. Bergman, R.G.; K. N. Raymond, F. D. Toste, F. D. *Science* **2015**, *350*, 1235-1238



**Figure:** Enantioselective Fluorination of Phenols by Chiral Anion Phase Transfer Catalysis<sup>3b</sup>