

2014-15

## *Willard Lectures in Physical Chemistry*



**Professor Cynthia M. Friend**  
**Harvard University**

### ***Towards Energy-efficient Chemical Synthesis: Selective Oxidation using Au***

**Monday, October 27**

**2:00 p.m.**

**Room 1315 Chemistry**

*Please join us for a reception on Monday, October 27 in the Shain Atrium after the seminar.*

Improving the energy efficiency for chemical synthesis is a key to addressing worldwide challenges in energy and the environment. Gold-based heterogeneous catalysts have the potential to improve efficiency by achieving high selectivity for key reactions, such as selective oxidation. We have combined fundamental surface chemistry studies with reactor studies on both single-crystals and nanoporous materials in order to develop a deep understanding of selective oxidation processes. Our work highlights the value of mechanistic understanding of reactions as a means of predicting new catalytic reactions and designing reaction conditions to optimize performance of catalysts.

### ***Harnessing The Power Of Light To Drive Chemical Reactions On Surfaces***

**Tuesday, October 28**

**11:00 a.m.**

**Room 1315 Chemistry**

*On Tuesday, Graduate Students may meet with the speaker at 1:30 pm in Room 9341.*

Photochemical processes on semiconducting metal oxide surfaces are used to remove organic pollutants and are also of interest in light-driven synthesis. Our investigations of  $\text{TiO}_2$  have demonstrated the critical role of specific defects in determining the reaction pathways and their efficiencies on metal oxides, underscoring the need to control stoichiometry. We have combined experiment and time-dependent density functional theory to describe selected photochemical processes. Our studies provide guiding principles in the design of materials for specific reactions, such as alcohol oxidation.