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# Department of Chemistry

## Dow Lecture Series

9:45 a.m. Tuesday, October 18, 2011 • 331 Smith Hall



Professor

### Douglas Stephan

Department of Chemistry  
University of Toronto

*Frustrated Lewis Pairs:*

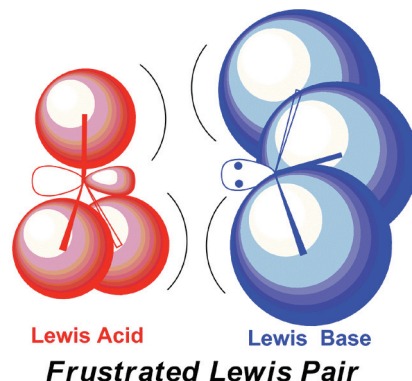
*A New Paradigm for Metal-Free Hydrogenation Catalysis  
and Small Molecule Activation*

Research interests span a range of inorganic main group and organometallic chemistry. In the more fundamental projects, new reactivity and chemical transformations are targeted with a view to developing new catalysts to either new materials or new processes.

Website: <http://www.chem.utoronto.ca/staff/DSTEPHAN/doug.html>

### Abstract

The activation of hydrogen has been the purvue of transition metals for 200 years. In recent work we have discovered the first metal-free system capable of  $H_2$  activation. Sterically encumbered Lewis acid and base combinations do not form *classical* Lewis acid-base adducts. Rather, the unquenched Lewis acidity and basicity of such sterically *frustrated Lewis pairs (FLPs)* is available for reactivity. Such systems have been shown to effect the heterolytic cleavage of hydrogen and applied to develop metal free hydrogenation catalysts. FLPs are also shown to exhibit unprecedented reactivity with a variety of other small molecules, including olefins, dienes, alkynes, cyclopropanes,  $CO_2$  and  $N_2O$ . The implications of the discovery of such systems and further details will be presented in this lecture.



Host: Assistant Professor Connie Lu  
Refreshments will be served prior to the seminar.