

# Chemical Engineering & Materials Science

---

## UNIVERSITY OF MINNESOTA



### Lanny Schmidt

**Regents Professor Emeritus**

#### Contact Information

Email: schmi001@umn.edu

Phone: 612/625-1313

#### Education

B.S., Chemistry, Wheaton College, 1960

Ph.D., Physical Chemistry, University of Chicago, 1964

---

### Research Interests

New chemical processes are the key in finding new ways to convert alkanes into useful chemicals and energy sources with improved efficiency, reactor simplicity, and lower costs.

Research in our laboratory focuses on catalytic partial oxidation to convert methane and higher alkanes into syngas, olefins, and oxygenated hydrocarbons using monolith catalysts operated autothermally with very short residence time. Renewable fuels such as alcohols, biodiesel, carbohydrates, and lignocellulose are also being examined. Experiments involve novel reactor configurations and catalysts to achieve high selectivity and yield to a desired product. Modeling involves simulation of the processes and description of reaction mechanisms using detailed surface reaction steps. Optical diagnostics and other techniques are used to probe boundary layer reactions to describe the role of homogeneous reactions in oxidation processes. Catalytic combustion and incineration in short contact time reactors are also being examined.

This research involves the interplay between surface chemistry, catalysis, materials, and reaction engineering and between experiments and modeling to discover and describe new chemical technologies.

### Selected Publications

High Yields of Olefins and Hydrogen from Decane in Short Contact Time Reactors: Rhodium versus Platinum (with J. Krummenacher), *J. Catalysis* 222, 429-438 (2004).

Renewable Hydrogen from Ethanol by Autothermal Reforming (with G.A. Deluga, J.R. Salge, and X.E. Verykios), *Science* 303, 993-997 (2004).

The Water Gas Shift Reaction at Short Times (with C. Wheeler and A. Jhalani), *J. Catalysis* 223, 191-199 (2004).

Catalytic Partial Oxidation of Higher Hydrocarbons: Reactivities and Selectivities of Mixtures (with R. Subramanian, G.J. Pannuccio, J.J. Krummenacher, and I.C. Lee) *Chemical Engineering Science*, 59, 5501-5507 (2004).

Renewable Olefins from Biodiesel by Autothermal Reforming (with R. Subramanian) *Angewandte Chemie*, 44, 302-305 (2005).

Catalytic Autoignition of Higher Alkane Partial Oxidation on Rh-Coated Foams (with K.A. Williams) *Applied Catalysis A: General*, 299 30-45 (2006).

