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**Date: June 27**  
**Time: 10:15 am – 11:15 am**  
**Room: SL 165**

**Everyone is invited**

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## **Non-Precious Metal Catalysts Development for Oxygen Electrode of Fuel Cells**

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### **Abstract.**

Platinum and its alloys are widely used as catalysts for oxygen electrode in proton exchange membrane (PEM) fuel cells; however, the oxygen reduction reactions (ORR) on Pt are much slower compared with hydrogen oxidation reactions on Pt surfaces. Furthermore, Pt catalysts are very sensitive to impurities such as CO, halogens, nitrogen and sulfur compounds, and low molecular weight organic molecules (such as methanol and ethanol resulted from crossover), which can poison Pt surface to inhibit their catalytic activity for ORR. The demands of Pt have exceeded the supplies for the last ten years, which resulted in soaring price for Pt. The design and development of novel non-precious metal catalysts with high catalytic efficiency, good stability, good tolerance of impurities and low cost is crucial to the successful commercialization of the PEM fuel cell technology as an energy source.

This presentation will cover our work in the area of non-precious metal oxygen reduction catalysts for fuel cell applications. By coupling multi-scale theoretical and experimental techniques, the study of oxygen reduction reaction mechanisms of several classes of transition-metal phthalocyanines as oxygen reduction catalysts will be presented. Knowledge gained through simulation, synthesis and characterization is used to help the design of the next generation non-precious metal catalysts for oxygen reduction reactions. When completed, the successful new class of non-precious metal catalysts developed in this study will have significant positive impacts on the efforts to commercialize fuel cell technology as a new energy source.

### **About the Speaker.**

- B. S., Physical Chemistry, Xiamen University, Xiamen, China. 1979-1983.
- Ph.D., Electrochemistry, Case Western Reserve University, Cleveland, Ohio, 1987-1993.
- Post-doctor, Case Western Reserve University, Cleveland, Ohio, 1993-1995.
- Engineer, Advanced Battery Development, Delphi E&C, Delphi, 1995-2000.
- Group Leader, Electrochemistry Group, Delphi E&C, Delphi, 2000-2005.
- Visiting Research Associate Professor, Department of Mechanical Engineering, IUPUI, 2005-present.