Heterogeneous Catalysis: Enabling the Breakthroughs for a Sustainable Energy Transition

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Abstract:

Energy is the backbone of modern civilization, fueling everything from our daily conveniences to our economic engines. However, the world is at a critical juncture, facing an urgent need to transition away from fossil fuel dependence toward more sustainable solutions. In this lecture, we will explore the global energy landscape, discussing how demographic and economic shifts are shaping our energy needs and solutions. We will outline a comprehensive roadmap for decarbonization, focusing on key strategies such as enhancing energy efficiency, electrifying industrial and domestic processes, advancing carbon capture technologies, and developing sustainable fuels.

Central to these strategies is heterogeneous catalysis—a powerful enabler of the technological breakthroughs required for energy sustainability. We will discuss how catalysis is driving advancements in bio-based chemicals, green chemical processes, and carbon-neutral fuel synthesis, among other areas. As we navigate these opportunities, we will discuss the role that catalysis could play in unlocking a future where energy systems are more efficient, equitable, and sustainable.