

## **Catalysis at the Nexus of Sustainability and Innovation: New Paradigms for Efficient Chemical Synthesis**

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Catalysis and sustainable chemistry are key drivers of modern innovation, enhancing efficient chemical processes and environmentally responsible technologies. In this seminar, a journey that connects fundamental discoveries with real-world applications, demonstrating how new catalytic tools and scalable aqueous technologies can reduce the environmental impact of chemical synthesis, will be discussed.

Our unified strategies promote resource-efficient transformations by applying green chemistry principles to minimize solvent use, energy demand, and waste generation while boosting reaction selectivity and scalability. By integrating novel catalysts—including heterogeneous, recyclable systems—with unconventional reaction media and technologies, we show that sustainable methods can outperform traditional methods without sacrificing chemical versatility. Through collaboration between academia and industry, one can develop cleaner and safer chemical manufacturing pathways. These advancements not only solve longstanding synthetic challenges but also encourage next-generation technologies for a circular chemical economy.