The talk will be divided into two main topics that have been the focus of my group's research in recent years.

**Topic 1: Hydrogen Storage**

I will present our latest findings on Iridium-catalyzed formic acid dehydrogenation. Our work centers on the use of [Cp*Ir(κ²-NN)(Cl)][OTf] complexes—featuring κ²-NN pyridyl-triazole ligands—as catalysts under neat conditions (i.e., in the absence of an external solvent). These systems have shown excellent performance, achieving turnover frequencies (TOF\_max) of up to 10,703 h⁻¹ and selectively producing a 1:1 mixture of hydrogen and carbon dioxide, with no detectable carbon monoxide. Kinetic studies and 1H NMR spectroscopy confirm that the active species is [Cp*Ir(CO)H₂].

**Topic 2: Palladium(I)-NHC Metalloradicals – Reactivity Towards Small Molecules**

This section will focus on the synthesis, characterization, and reactivity of mononuclear Pd(I)-NHC metalloradicals. I will discuss their reactions with O₂, which lead to the formation of radical superoxide species, and with H₂, which proceed via a radical pathway to form Pd(II) monohydride complexes.