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## Organochalcogens & Organo Metal-Selenolates: Synthesis & Catalysis

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Chalcogen bonding (ChB) interaction plays a decisive role in stabilizing the intermediates involved in the catalytic cycle of GPx selenoenzyme for the reduction of H<sub>2</sub>O<sub>2</sub>. In continuation of our work on organochalcogens, intramolecular Se/Te···N bonded organoselenuranes and organotelluranes have been synthesized and their application for small molecule activation and as organocatalyst have also been explored. The effect of Lewis acidic chalcogen (Se, Te) center in tetravalent chalcogens and presence of stabilizing quinolone group has been studied in the H<sub>2</sub>O<sub>2</sub> decomposition and synthetic transformation reactions.

Hydrogen(H<sub>2</sub>) is a clean fuel that, when consumed in a fuel cell, produces only water. Inspired by nature and by the non-transition metal electrocatalysts, for hydrogen evolution reactions (HER). In continuation of our work on metal–selenium chemistry, we report the novel bimetallic zinc selenolate electro-catalyst that catalyzes the ligand centered hydrogen evolution reactions under acidic medium. Next, we also report the synthesis and characterization of novel copper(II) phenolate selenoether complexes by using ortho-*bis*-bisphenylselenide-phenol ligands. The synthesized complexes with optimal distorted square pyramidal geometry electrocatalyze the HER with a faradaic efficiency (F.E.) of up to 89%.