I^{2}CNER

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Activation of H_2 and CO

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The ability to catalyze the oxidation of both dihydrogen (H_2) and carbon monoxide (CO) in same pot would be a major boon to hydrogen technology since CO is a consistent contaminant of H_2 supplies. Here, we report just such a catalyst, with the ability to catalyze the oxidation of either or both H_2 and CO, based on pH (Fig. 1). This catalyst is based on a NiIr core that mimics the chemical function of [NiFe]hydrogenase in acidic media (pH 4-7) and carbon monoxide dehydrogenase in basic media (pH 7-10). We have applied this catalyst in a demonstration fuel cell using H_2, CO, and H_2/CO (1/1) feeds as fuels for oxidation in the anode. The fuel cell's power density depends upon the pH in the media of the fuel cell and shows a similar pH dependence in-flask. We have isolated and characterized all intermediates in our proposed catalytic cycle.

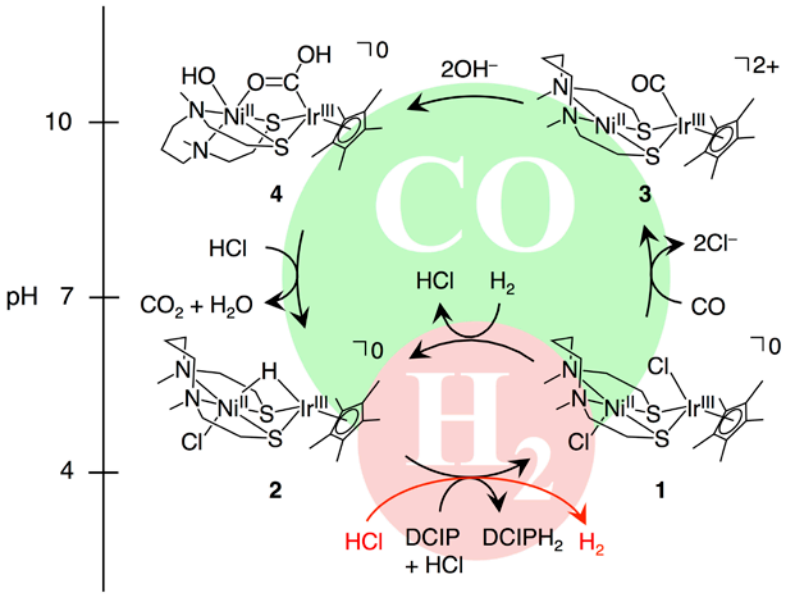

Fig. 1 pH-dependent activation of H_2 and CO with NiIr complexes.