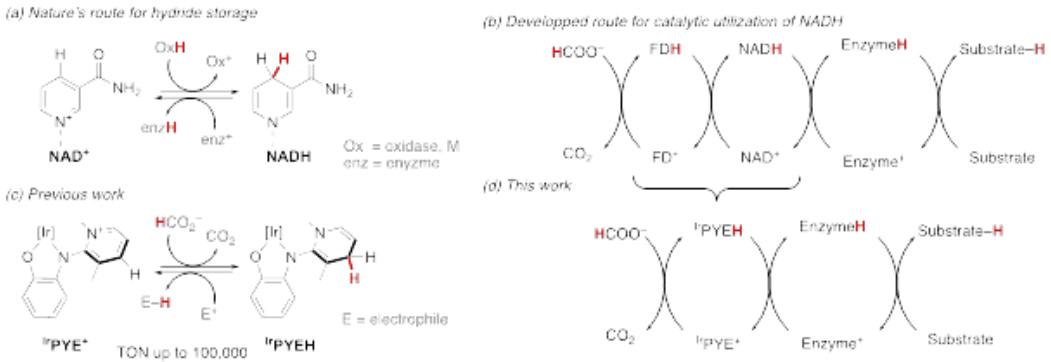
^{Ir}PYE^{+} / ^{Ir}PYEH complex as self-regenerated NADH cofactor

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NADH is an important cofactor that plays a critical role in most oxidoreduction enzymatic processes relying on reversible storage of the hydride on the nicotinamide moiety (Fig. 1a). However, NADH is limited by its high cost, low stability, and stoichiometric utilization. [1] In the past years, several groups investigated different cofactor regeneration systems as well as the use of synthetic cofactors aiming to reduce the cost associated with NADH-dependent reactions. [2], [3]

Our group recently developed an iridium complex bearing a pyridylidene-amines (PYEs) ligand that was successfully applied in the dehydrogenation of formic acid.[4] Interestingly, ligand optimization showed a unique functional ligand-type reactivity where the hydride is stored on the heterocycle ring, mimicking an NADH-type reactivity (Fig. 1c).[5] Herein, we are investigating the possible application of the iridium complex into chemoenzymatic processes in a multidisciplinary way, combining a computational, biocatalytic and organometallic approach (Fig. 1b and 1d).



[1] Lara Sellés Vidal, Ciarán L. Kelly, Pawel M. Mordaka, John T. Heap, *Biochim Biophys Acta Proteins Proteom*, **2018**, 1866, 327–347.
[2] Hong Wu, Chunyong Tian, Xiaokai Song, Chuang Liu, Dong Yang, Zhongyi Jiang, *Green Chemistry*, **2013**, 15, 1773–1789.
[3] Caroline E. Paul, Frank Hollmann, Appl Microbiol Biotechnol. **2016**, 100, 4773-4778
[4] Nicolas Lentz, Martin Albrecht, *ACS Catal.* **2021**, 12, 12627–12631.
[5] Nicolas Lentz, Sabela Reuge, Martin Albrecht, **submitted**.