Portland State
Chemistry

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Elucidating Proton-Coupled Electron Transfer Mechanisms Underpinning the Catalytic Generation of Renewable Fuels

ABSTRACT: The conversion of energy-poor feedstocks like water and carbon dioxide into energy-rich fuels involves multi-electron, multi-proton transformations. In order to develop catalysts that can mediate fuel production with optimum energy efficiency, this complex proton-electron reactivity must be carefully considered. Using a combination of electrochemical methods and time-resolved spectroscopy, we have revealed new details of how molecular catalysts mediate the reduction of protons to dihydrogen and the experimental parameters that dictate catalyst kinetics and mechanism. Through these studies, we are revealing opportunities to promote, control and modulate the proton-coupled electron transfer reaction pathways of catalysts.