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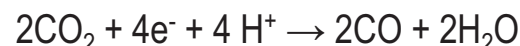
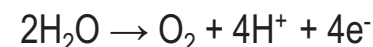
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Science

Splitting CO_2 into CO and O_2 Electrochemically One Catalyst is Enough

Z. Chen, J.J. Concepcion, M.K. Brennaman and T.J. Meyer
UNC Energy Frontier Research Center, University of North Carolina at Chapel Hill

ACHIEVEMENT: We have identified a single Ru metal complex catalyst that carries out both water oxidation and CO_2 reduction reactions at separate electrodes in an electrochemical cell.

SIGNIFICANCE: Solar fuels – water splitting into hydrogen and oxygen, water reduction of CO_2 to CO , other oxygenates, or hydrocarbons for energy storage – are a key to a future solar energy economy. A major challenge arises from carrying out the multi-electron, multi-proton half reactions for water oxidation and CO_2 reduction:



Accomplishing these reactions with a single catalyst molecule provides a startling contrast to natural photosynthesis. In photosynthesis, sunlight uses water to reduce CO_2 to carbohydrates in integrated catalytic assemblies involving millions of atoms, five membrane-bound assemblies, and the Calvin cycle, and evolved over billions of years.

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