

AN EFFICIENT HOMOGENEOUS ELECTROCATALYTIC WATER OXIDATION BY A UNIQUE MANGANESE CLUSTER Galia Maayan and George Christou. Department of Chemistry, University of Florida, PO Box 117200, Gainesville, FL 32611-7200.

In natural photosynthesis, the catalytic splitting of water into oxygen and hydrogen utilizes sunlight energy and a high oxidation state manganese cluster. Few synthetic high-valent manganese complexes have been applied to date as water oxidation catalysts in homogeneous and heterogeneous systems. The use of electrochemical energy for homogeneous water oxidation catalyzed by a manganese cluster, however, has not been demonstrated. Herein we present the synthesis and characterization of a unique polynuclear Mn cluster, which is highly soluble and stable in water as indicated by spectroscopic studies. Electrochemical investigations in acetate buffer solutions revealed pH dependent catalytic currents at an oxidation potential as low as 1.0V (vs the NHE). O₂ evolution was clearly detected by a typical reduction peak observed in cyclic voltammograms. Controlled potential electrolysis indicates that this catalyst not only performs with high turnover number in low potential, but also functions in seawater.