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Molecular Catalysts for Water Splitting

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Decomposing water is the more direct way to produce hydrogen, which can be stored and utilized as a transportable fuel or converted into energy-rich organic molecules, to cope with the intermittent character of the solar radiation. The Oxygen Evolving Complex (OEC) is the native enzyme that catalyzes the oxidation of water in natural photosynthesis to release oxygen. This constitutes one of the half reactions of water splitting. The creation of biomimetic systems to reproduce the basic chemistry of this process gives us more insight into better understanding this crucial natural reaction which is responsible of the atmospheric oxygen that we breathe.

In this communication we report the ability of a number of manganese complexes to split water, that has been studied by means of water photolysis experiments. The synthetic models to be presented show different structural features: monomers, μ-aquo dimers, μ-phenoxo dimers, dimer-of-dimers and tetrameric complexes. The discussion concerning the photolytic behaviour encompasses the advances made in the new insights on the structural features ascertained through the development of characterization techniques. Supramolecular interactions arise as a key factor to enhance the ability of these systems to split water. A dimer-of-dimers manganese complex, described in this work, appears as a precursor of an extremely active photolytic catalyst.

Biography:

Dr. Maneiro received his Ph.D. degree in 1998 at University of Santiago de Compostela USC (Spain), working on the field of artificial photosynthesis. From 1998 to 2000, Maneiro was a Postdoctoral Fellow at Princeton University, USA; in 2004, he was a Visiting Researcher at the RCSI, Ireland. Since 2000, Maneiro has occupied different researcher and academic positions at USC, and he became a Professor of inorganic chemistry in 2007. Maneiro has authored more than 55 scientific publications. His research topics focus on biomimetic catalysts studying their capacity to oxidize water or their antioxidant activity.