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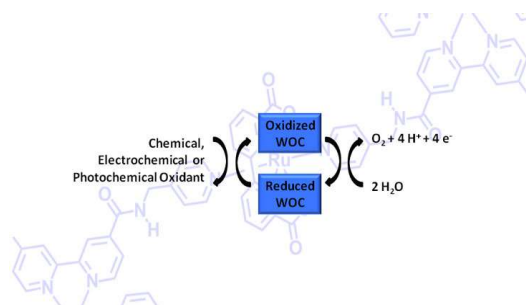
Chemical, Electrochemical and Photochemical Molecular Water Oxidation Catalysts



Hydrogen release from the splitting of water by simply using sunlight as the only energy source is an old human dream that could finally become a reality. A SelOxCat research group paper reports the most notable advances in this process, which includes the study of the catalytic oxidation of water by using molecular compounds containing transition metal ions, with examples where the catalysis is triggered chemically, electrochemically or photochemically.

The SelOxCat (Selective Oxidation Catalysis) research group focus its attention on the design and preparation of molecular or colloidal systems and hybrid materials to be applied as catalysts in oxidation-reduction reactions. Particularly, the group is interested in the study, understanding and development of key reactions for the production of renewable fuels from water and sunlight, such as the oxidation of water to oxygen gas and the reduction of protons to hydrogen gas, or the reduction of carbon dioxide to methanol or methane gas. In this review we highlight the latest most prominent results in water oxidation catalysis by employing molecular compounds containing transition metal ions.

Hydrogen release from the splitting of water by simply using sunlight as the only energy source is an old human dream that could finally become a reality. This process involves both the reduction and oxidation of water into



hydrogen and oxygen gas, respectively. While the first process has been fairly overcome, the conversion of water into oxygen has been traditionally the bottleneck process hampering the development of a sustainable hydrogen production based on water splitting. Fortunately, a revolution in this field has occurred during the past decade, since many research groups have been conducting an intense research in this area.

Thus, while molecular, well-characterized catalysts able to oxidize water were scarce just five years ago, now a wide range of transition metal based compounds has been reported as active catalysts for this transformation. This review reports the most prominent key advances in the field, covering either examples where the catalysis is triggered chemically (by addition of a chemical oxidant), electrochemically (by applying a positive voltage) or photochemically (by using light as the excitation energy source).

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References

Bofill, Roger; García-Antón, Jordi; Escriche, Lluís; Sala, Xavier. Chemical, electrochemical and photochemical molecular water oxidation catalysts. *Journal of Photochemistry and Photobiology B: Biology*. 2015, vol. 152, part A, p. 71-81. doi: 10.1016/j.jphotobiol.2014.10.022.

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