

## References

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### The Authors

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## Ruthenium-Manganese Artificial Photosynthesis Systems

Solar energy is a promising source for sustainable production of fuel and electricity. One way to harvest solar energy is to mimic natural photosynthesis using an artificial system. In plant photosynthesis the key enzyme is Photosystem II, (PSII), where light is absorbed by a chlorophyll unit, starting the conversion of light energy into chemical energy. PSII contains a triad: a cluster of four manganese (Mn) ions which transfer electrons, via tyrosine<sub>Z</sub> (a redox active amino acid) to the photooxidised chlorophyll P<sub>680</sub><sup>+</sup>, which uses the electrons to oxidise water molecules to oxygen. A crucial part of this process is electron transfer from the Mn to P<sub>680</sub><sup>+</sup>. Light drives electron transport from water to a quinone acceptor which is reduced and used further in bioreactions.

Researchers from Stockholm University, Uppsala University and the University of Lund, Sweden, are currently designing and synthesising multifunctional supramolecular complexes hoping to achieve the

light-driven oxidation of water, based on the principles of PSII (L. Sun, L. Hammarström, B. Åkermark and S. Styring, *Chem. Soc. Rev.*, 2001, 30, (1), 36-49). They have investigated progressively more complex systems. Synthetic multinuclear ruthenium (Ru)-Mn complexes, in which a Ru tris-bipyridine complex replaces the P<sub>680</sub>, can mimic the electron transfer. A tyrosine unit replaces the tyrosine<sub>Z</sub> of PSII. An external electron acceptor accepts an electron transferred by the Ru complex upon absorption of light. The photogenerated Ru(III) then recovers an electron from the Mn cluster or the tyrosine unit and reverts to Ru(II). The Mn cluster has appropriate redox properties and is capable of multiple electron transfer needed for splitting water molecules. The Mn complexes are oxidised or a tyrosine radical is generated. The model system closely mimics the primary reaction steps on the donor side of PSII, but as yet catalytic water oxidation has not been achieved.

## The Seventh Grove Fuel Cell Symposium

The seventh Grove Fuel Cell Symposium will take place at the Queen Elizabeth II Conference Centre, London, on 11-13th September 2001. The Symposium, entitled 'Commercialising Fuel Cells: The Issues Outstanding', is intended to give delegates an up-to-date global review of the technology and applications of fuel cells. The major subject areas for discussion will include: stationary fuel cells, transport applications, portable power, defence applications and significant developments in new science and technology.

There will be an extensive poster display and an exhibition area. Further details may be obtained from Ms Sarah Wilkinson, Seventh Grove Fuel Cell Symposium, Elsevier Science, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB,

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