Development of a Water Oxidation Catalyst by the Integration of Pentanuclear Iron Complexes and Graphene Oxide

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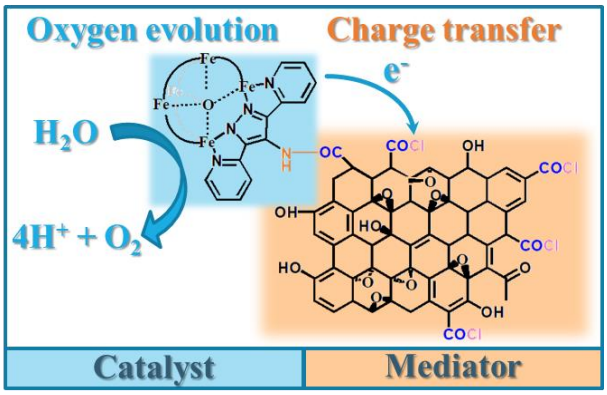
Water oxidation is vital for artificial photosynthesis. In nature, the water oxidation is efficiently conducted by the Mn_4Ca-cluster, Tyr amino acid residues and P680 chromophore.[1] In contrast, the water oxidation catalyst with the charge mediator and photosensitizer has been rarely reported in artificial systems. We previously demonstrated that linking the catalyst with the hole transporter enhances the water oxidation activity.[2] Encouraged by the result, we envisaged that combining the electron-mediating material (graphene oxide) with an efficient molecular catalyst could further enhance the water oxidation performance.

Herein we report a catalytic system for water oxidation by integrating a pentanuclear iron complex and graphene oxide. It was confirmed that the amide bond was newly formed and the interlayer distance was enlarged in the composite. The electrochemical result suggested that the water oxidation activity was hugely enhanced by the immobilization of pentanuclear iron complex. The catalytic current remained almost unchanged during 10 cycles of scans in cyclic voltammetry tests, which implies the long-term stability of the composite. Different from previous research concentrating on optimizing the structure of the catalyst, this method presents an entirely new method to improve the water oxidation performance by introducing electron-mediating functional material to the catalyst.



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