Novel mesoionic carbene ligands for robust iron based water oxidation catalysis

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Water oxidation catalysis is likely going to play an important role in the transition to an economy based on renewable resources. Many water oxidation complexes based on second and third row metals show excellent performance, but unfortunately these elements are rare and costly. Therefore, the development of robust first row transition metal catalysts is of great interest. Current literature examples of iron based complexes have turnover numbers of around 1200 in aqueous media, and are based on tetradentate nitrogen donor ligands. In this work, we replace one of the nitrogen donor groups of the ligand with a mesoionic carbene donor. This novel ligand is prepared in four steps with high yield and easy purification. When coordinated to iron, the resulting complex that has up to 6000 turnovers in water oxidation at fast rate. In addition, this represents the first example of an iron based water oxidation catalyst with a carbon donor. In this presentation I will discuss these exciting results, as well as more in depth studies. We hope that this leads to discoveries in new avenues of efficient water oxidation catalysts.

The state of the art water oxidation catalyst in literature and our new complex based on a mesoionic carbene ligand.


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