Proc. of the Intl. Conf. on Nanotechnology for Better Living, 2016
Editors K. K. Kar, A. Shah and R. Sharma
Vol. 3, No. 1, p. 34
doi:10.3850/978-981-09-7519-7nbl16-rps-34

Catalytic water splitting with based copper metal scorpionate

Sabeel M Basheer* and A. Sreekanth

Department of Chemistry, National Institute of Technology, Trichy, Tamil Nadu-620015
*Email: sabeelmb@gmail.com

The well-known environmental clean source of energy, hydrogen and oxygen, can be produce by water oxidation. Now a days, the oxides of platinum, ruthenium and iridium are the widely using materials in industry as most efficient catalyst for the production of hydrogen from water. Copper is the one among the high abundant metal in earth and cost effective metal. Reported here is the copper based scorpionate complexes for electrolytic water oxidation. The copper tris(pyrazolyl)borate and copper bis(pyrazolyl) borate complexes have been prepared and thoroughly characterized. Cyclic voltammetry (CV) of the catalysts at various pH values ranging between 6 and 14 shows large and irreversible currents, which attributes the catalysis (Figure 1). The reaction overpotential, where the onset of catalysis occurs, is found to be 1.16 V. The CV data show that the catalysts have the rapid homogeneous water splitting reaction and the efficiency is high at higher pH. The turnover frequency of the complexes are around 100 s^{-1}. Among the complexes, the copper tris(pyrazolyl)borate shows more turnover frequency than copper bis(pyrazolyl)borate. Hence, the increasing metal-nitrogen bonds help to increase the efficiency of water splitting.

Keywords: water splitting catalyst, scorpionate complex, turnover frequency

References

1. E. Selli , G. L. Chiarello , E. Quartarone , P. Mustarelli , I. Rossetti , L. Forni , Chem. Commun., (2007) 5022
2. F. Zhou, A. Izgorodin, R. K. Hocking, V. Armel, L. Spiccia, D. R. MacFarlane, Chem. Sus. Chem., 6 (2013) 643 – 651

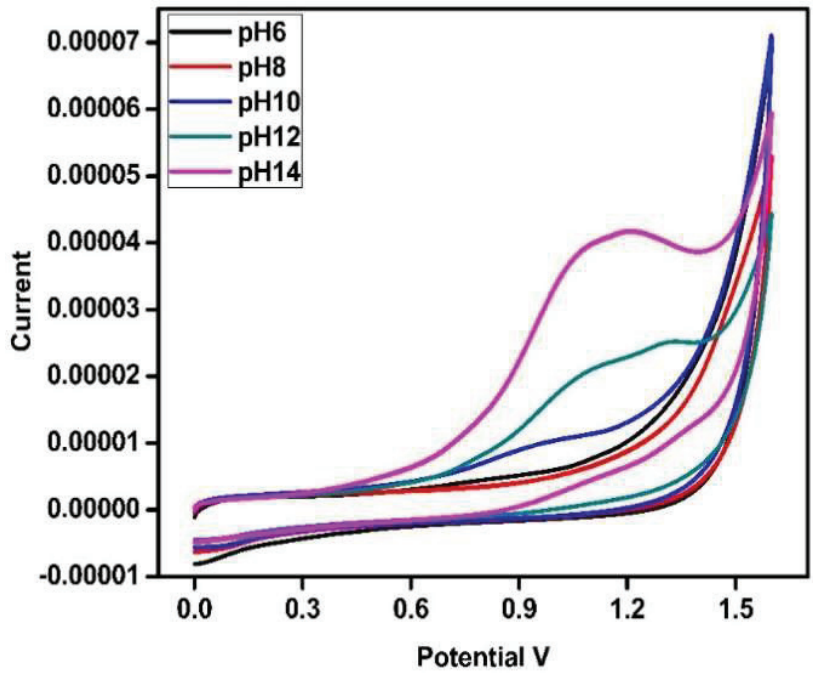

Figure 1: CVs of solutions containing 1.0 mM copper complex