

Boosting oxygen reduction catalysis with self-assembled Fe-N doped carbon material

Linhui Yu ¹, Yangming Lin ¹, Robert Schlögl ^{1,2}, Saskia Heumann ¹

¹Max Planck Institute for Chemical Energy Conversion, Mülheim a. d. Ruhr, Germany

²Fritz Haber Institute of the Max Planck Society, Berlin, Germany

Email: linhui.yu@cec.mpg.de

Abstract

The oxygen reduction reaction (ORR) is the relevant catalytic reaction that is taking place in a fuel cell at the cathode. Fe-N doped carbon materials (Fe-N-C) are considered as promising candidates to replace expensive and non abundant Pt/C based catalysts.^[1] Fe-N species are widely discussed as the possible active sites for ORR, but it is debatable which type of Fe-N species is the essential active site because it is hard to obtain materials with separated or exclusive species. Here, Fe-N-C is synthesized with only one kind of Fe-N species (Fig. 1a), which possesses the excellent onset potential of 1.05V (vs RHE) and a half-wave potential of 0.89 V (40 mV higher than Pt/C) in alkaline media (Fig. 1b). It can be anticipated that our work can provide a reasonable explanation for understanding the mechanism of Fe-N-C-based electrocatalysis.

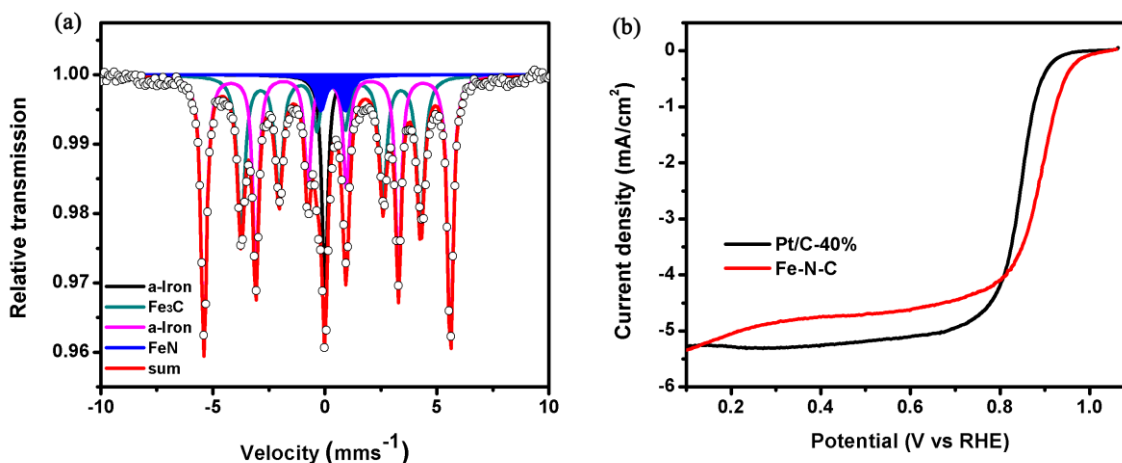


Fig. 1 (a) The Mossbauer spectra of Fe-N-C sample measured at 80 K with only one type of Fe-N species obtained. (b) LSV curves of Pt/C-40% and Fe-N-C samples measured in Ar-saturated 0.1 M KOH.

References

[1] R. Jiang, L. Li, T. Sheng, G. Hu, Y. Chen and L. Wang, *J. Am. Chem. Soc.* **2018**, *140*, 11594-11598.