

EFFECT OF CARBON SUPPORTS IN MIXED PHTHALOCYANINE-MODIFIED CATALYSTS FOR OXYGEN ELECTROCATALYSIS

Yogesh Kumar,¹ Elo Kibena-Pöldsepp,¹ Marek Mooste,¹ Jekaterina Kozlova,² Arvo Kikas,² Jaan Aruväli,³ Maike Käärrik,¹ Vambola Kisand,² Jaan Leis,¹ Aile Tamm,² Steven Holdcroft,⁴ José H. Zagal,⁵ Kaido Tammeveski¹

¹*Institute of Chemistry, University of Tartu, Ravila 14a, 50411 Tartu, Estonia*

²*Institute of Physics, University of Tartu, W. Ostwald Str. 1, 50411 Tartu, Estonia*

³*Institute of Ecology and Earth Science, University of Tartu, Vanemuise 46, 51014 Tartu, Estonia*

⁴*Department of Chemistry, Simon Fraser University, 8888 University Drive, Burnaby, BC, V5A 1S6 Canada*

⁵*Departamento de Química de los Materiales, Facultad de Química y Biología, Universidad de Santiago de Chile, Av. Libertador Bernardo O'Higgins 3363, Estación Central, Santiago, 9170124 Chile*

E-mail: yogesh.kumar@ut.ee

Over the past few decades, researchers are on search for catalysts to replace platinum group metals (PGM) for oxygen reduction reaction (ORR) and oxygen evolution reaction (OER). Among the alternatives, transition metal and nitrogen co-doped nanocarbons have attracted researchers' attention due to their comparable activity to PGM and lower price [1-3]. To understand the role of carbon supports in bifunctional electrocatalysts, we studied the electrocatalysts prepared using one-step pyrolysis of a combination of transition metal phthalocyanines (MPc, M= Fe, Ni) and different carbon supports. The ORR/OER activity of these catalyst materials was investigated and further explained on the basis of different physical characterisation results.

Among the prepared catalysts, meso-porous carbon (MC) and multi-walled carbon nanotube (MWCNT) based FeNiN-MC and FeNiN-MWCNT catalysts showed the superior electrocatalytic ORR activity in alkaline media with half-wave potential of around 0.88 V vs RHE, which is comparable to that of Pt/C. The catalysts were tested in anion-exchange membrane fuel cells (AEMFCs) as cathode material and very good peak power density of 406 mW cm⁻² was obtained for FeNiN-MWCNT [4]. Altogether, this study reveals the role of carbon supports in preparing the bifunctional ORR/OER electrocatalysts with transition metal macrocyclic complexes.

References

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