NiSe-doped carbons as cathodes for primary Zn-air batteries

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Zinc-air batteries represent promising devices for sustainable energy solutions, yet their widespread applications are limited due to the need for efficient, non-noble metal catalysts for oxygen reduction reaction (ORR). In this study, we address this challenge by synthesizing a series of NiSe-doped porous carbon materials through a straightforward, one-step carbonization process involving an ionic liquid containing Ni and Se. Characterization via XRF and FTIR confirmed the successful doping of NiSe into the carbon matrix. Subsequent electrochemical testing in both alkaline (0.1 M KOH) and neutral (0.1 M PBS) electrolytes revealed the superior ORR activity of the synthesized carbon materials. Our findings demonstrate high electrocatalytic performances and $4e^-$-ORR pathway in both electrolytes, underscoring the potential of NiSe-doped porous carbons as cathode materials for primary Zn-air batteries, thus advancing the quest for efficient and sustainable energy storage solutions.

Acknowledgement: The research was funded by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia on the research programs: Grants No. 451-03-47/2023-01/200017.