NEW CARBON-BASED CATALYST SYNTHESIS FROM SPENT LI-ION BATTERIES FOR ELECTROCHEMICAL OXYGEN REDUCTION

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With the wide usage of Li-ion batteries (LIBs) in portable electronics, electric vehicles, and grid storage, recycling and reusing LIBs have attracted wide attention. In this work a novel strategy was proposed for recycling the graphitic anode materials and then, graphite has been used as a precursor material to prepare nitrogen-doped graphene (Bat-NG) as a valuable catalyst for oxygen reduction reaction. The prepared Bat-NG was characterized by XRD, SEM, TEM, XPS and Raman spectroscopy and the electrocatalytic activity of the resulting catalyst material towards oxygen reduction reaction (ORR) was investigated in alkaline media using the rotating disk electrode (RDE). Based on the RDE results of ORR, Bat-NG showed much high electrocatalytic activity than Comm-NG catalyst caused probably by a higher content of active nitrogen species (18.2% for Bat-NG vs. 2.0– 4.0% for Comm-NG) and the presence of carbon vacancies on the surface of graphene [2,3] [fig.1]. The findings clearly demonstrate the importance of recycling graphite from spent LIB and its comprehensive utilization as a sustainable approach for synthesis of electrocatalysts.

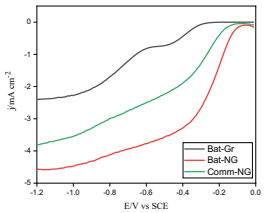

Fig.1. Comparison of RDE results of O_2 reduction with different catalysts (Bat-NG, Comm-NG and Bat-Gr) on modified Glassy carbon electrodes in O_2-saturated 0.1 m KOH, v=10 mV.s^{-1}, ω=1600

References

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