

Contribution ID : 29

Type : not specified

Electrolytic manganese dioxide from secondary sources suitable for energy storage applications

Recycling of material from secondary/spent catalysts is utmost essential in the present day1. A novel approach has been made to synthesize electrolytic manganese dioxides (EMD) from secondary sources2, such as manganese cake (EMDCake), manganese leach residue (EMDLR) and cobalt manganese bromide spent catalyst sludge (EMDCMBS). The synthesized materials were characterised using various physico-chemical techniques. X-ray diffraction pattern confirmed the presence of γ -phase in all the cases. TEM analysis suggests the presence of needle like grains within the range of 20-40 nm. Electrochemical characterisation carried out by galvanostatic charge-discharge technique revealed that the initial discharge capacity of EMDCake, EMDLR and EMDCMBS were 280, 267 and 240 mAh g-1 respectively in 9M KOH in Zn/MnO2 system. The chemical composition of the EMDs were determined and compared with the BIS standard3 (Bureau of Indian standard, 1996). All the materials found to be suitable for alkaline primary battery applications. The synthesized EMDs are quasi-reversible with continuous charge/discharge cycling.

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- 2. A. Biswal, B. C. Tripathy, K. Sanjay, T. Subbaiah, and M. Minakshi, RSC Adv. 5 (2015) 58255.
- 3. Bureau of Indian Standard 1996, "Manganese dioxide for dry batteries", IS-11153.

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