

Crystallinity and morphological evolution of hydrothermally synthesized potassium manganese oxide nanowires

ABSTRACT

Potassium manganese oxide ($\text{KMn}_8\text{O}_{16}$) nanowires were synthesized using a customized hydrothermal method and characterized using scanning-electron microscopy, X-ray diffractometry and thermogravimetric analysis to determine the effects of reaction temperatures and molar ratio of reactants on the crystallinity and morphology of the synthesized nanowires. It was established that increasing the stoichiometric portion of potassium precursors increased the average nanowire diameter though such effect was comparatively less prominent in terms of reaction temperature. Deficient supply of potassium inhibited nanowires growth in which only $\text{KMn}_8\text{O}_{16}$ (cryptomelane) growth orientations of (211), (301) and (600) were observed along with traces of MnO_2 , resulting in a wool-like nanowires suspension.

Keyword: B. Electron microscopy; B. Nanocomposites; D. Transition metal oxides; Hydrothermal