Poster Presentation

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Synthesis and oxidation resistance of nanostructured 2D-WS2

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Nanostructured two-dimensional (2D) tungsten disulphide (WS2) is an excellent multi-functional material with potential applications as solid lubricant in aerospace and automotive sectors, as an electronic material as well as a versatile catalyst and electrode material for Li-ion batteries. In many of these applications, the material is exposed to temperatures above normal ambient conditions. Thus, oxidation resistance of the material is an important issue in its performance. In this study 2D-WS2 nanosheet powders with an average thickness of about 10 nm was synthesized by a gas- solid reaction method [1]. Oxidation resistance of these as synthesized nanostructured 2D-WS2 was studied in the temperature range of 30-700°C in air using differential scanning calorimetry (DSC). The oxidation behaviour, as manifested by the various peaks in the DSC profile at intermediate stages of heating, was investigated by high intensity micro-area 2D-X-ray diffraction. Oxidation resistance of the different grades of WS2 nanosheet powders was compared with that of commercially available coarse grade WS2 and it was found that WS2 nanosheet was stable up to a temperature of about 300°C in air. Complete oxidation of the 2D -WS2 nanosheet powder was observed at about 450°C when it converted to spherical shaped monoclinic WO3 particles with an average size of ≤ 10 micrometer.

[1] Joardar, J. and Sylvester, M.S. (2012). Patent No. 1703/DEL/2012.

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