

Nano-particles Formation of Crystalline MnPS₃ Material under Specific Conditions

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Abstract

Specific conditions have been applied to intercalate pyridine organic compound in interlayer gap of the crystalline materials (MnPS₃). The intercalation was processed in presence of concentrated HCl and distilled water at 60 °C. Nitrogen stream was injected during intercalation. The most important feature of applying these conditions is the formation of nanoparticles. The crystallite size is about 29 nm. In addition to this feature, three phases appeared under such conditions as confirmed by X-ray diffraction with d-spacing = 10.7 Å, 9.6 Å and 7.3 Å, respectively. The phase transformation occurs only between the two phases of d-spacing 10.7 Å and 9.6 Å. The magnetic properties of the materials are affected by the phase transformation. Moreover, a complete intercalation in the MnPS₃ is confirmed by the XRD and infrared (IR) measurements.

Keywords: Nanomaterial; Pyridine; intercalation; X-ray diffraction; Crystal structure

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