

Semiconductor Layered Crystalline Materials to Encapsulate Organic Compounds

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Abstract

Semiconductor nanomaterials (FePS_3 and MnPS_3) were intercalated with organic compounds, N,N'-Dimethyl-4,4'-bipyridinium (DBP) and pyridinium cations. The resulted compounds have been characterized by X-ray diffraction (XRD) and elemental analysis. Insertion of The DBP expands lattice spacing by 3.4 Å with respect to FePS_3 and MnPS_3 . There was no phase transformation of leaving the intercalated sample in open atmosphere. Insertion of pyridinium expands lattice spacing by 3.4 Å and 5.9 Å with respect to FePS_3 and MnPS_3 . Phase transformation was occurred after leaving the sample in open atmosphere for few days. The molecular size of intercalates may play a role in the lattice expansions. The XRD patterns exhibit sharp $00l$ reflections of the intercalated compounds. This means that materials are well crystalline. The intercalation of such materials gives a chance to encapsulate hazardous organic compounds, such as DBP, which can be applied safely.

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