

# Insertion of In(III) and Ga(III) into MPS3 (M = Mn, Cd) layered materials

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$\text{In}_{0.20}\text{Mn}_{0.70}\text{PS}_3$ ,  $\text{Ga}_{0.28}\text{Cd}_{0.58}\text{PS}_3$  and  $\text{In}_{0.33}\text{Cd}_{0.50}\text{PS}_3$  compounds were synthesized by insertion of trivalent cations ( $\text{In}^{3+}$  and  $\text{Ga}^{3+}$ ) into MPS3 (M = Mn, Cd). The insertion process requires the previous intercalation of  $\text{K}^+$  ions into these matrices, giving rise to new materials belonging to the MPS3 family. Such compounds were characterized by X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM), energy-dispersive X-ray (EDX) microprobe, differential thermal and thermogravimetric analyses (DTA/TGA), magnetic susceptibility measurements, and electrochemical impedance spectroscopy. It is inferred that the trivalent cations were incorporated, rather than intercalated, into the intralamellar region, i.e., the cations were located in the interlamellar space, following the typical topotactic ion-exchange processes of the monovalent cations. Clement and Michowicz reported a similar case for  $\text{Ni}^{2+}$  insertion