

# Physical properties of layer-type MPS3 compounds: $M_{0.5}In_{0.33}PS_3$ (M=Cd, Fe, Mn)

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$Cd_{0.5}In_{0.33}PS_3$ ,  $Fe_{0.5}In_{0.33}PS_3$ ,  $Mn_{0.5}In_{0.33}PS_3$ , and compounds have been synthesized by ceramic method at 923 K. These compounds were characterized by powder X-ray diffraction (XRD), Fourier transform infrared (FTIR), differential thermal and thermogravimetric analyses (DTA/TG), energy dispersive X-ray (EDX), magnetic susceptibility measurements and electrochemical impedance spectroscopy. The antiferromagnetic interactions present in the phases MPS3, are attenuated in the mixed phases  $M_{0.5}In_{0.33}PS_3$ . This is explained by the larger separation of the ions  $M^{2+}$  in the mixed phase and therefore by a decrease of the magnetic interaction. The limit phase FePS3 is the more conductive one among the MPS3 compounds. This tendency is maintained in the studied mixed phases. Thus, the phase  $Fe_{0.5}In_{0.33}PS_3$  shows an electrical conductivity of  $\sigma=3.0 \times 10^{-8}$  S/cm at room temperature. © 2001 Elsevier Science B.V. All rights reserved.