



# Investigation on the magnetic and Mössbauer spectroscopy of $^{57}\text{Fe}$ doped $\text{LiMnPO}_4$

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## Abstract

The  $^{57}\text{Fe}$  doped  $\text{LiMnPO}_4$  cathode with potential applications in Li-ion batteries was prepared by solid-state reaction. The magnetic susceptibility ordered antiferromagnetically at Néel temperature ( $T_N = 34$  K). The spin reorientation temperature ( $T_S$ ) and effective moment were determined to be 8 K and  $5.78 \mu_B$ . We obtained the Mössbauer spectra at various temperatures and fitted the spectra below  $T_N$  to eight absorption lines. The behavior of the magnetic hyperfine field and the quadrupole splitting change with increasing temperature above  $T_S$  indicates that the quenched orbital angular moment is due to a strong crystal field at the  $\text{Mn}(\text{Fe})\text{O}_6$  site.

**Keywords** Cathode ·  $^{57}\text{Fe}$  Mössbauer spectroscopy · Lithium batteries · Spin reorientation