μ^+SR study on olivine-type $Na_{0.7}FePO_4$

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Among several cathode materials for the Na-ion battery, transition metal polyphosphates would be a promising candidate due to their excellent redox abilities and thermal stability. Nevertheless, the structural, magnetic, and diffusive properties of Na*x*FePO4 are still not fully clarified so far, although a few work are available [1–3]. Here, we report the result of our initial μ^+SR study on $Na_{0.7}FePO_4$ in order to investigate the magnetic and diffusive nature.

ZF-μ^+SR measurements in TRIUMF revealed the appearance of static magnetic order below T_N~60 K, at which the $\chi(T)$ curve exhibits a sharp maximum due to an antiferromagnetic transition. The wide distribution of the internal magnetic field is probably caused by an inhomogeneous field at muon sites due to a random distribution of the vacant Na sites. On the contrary, the ZF-spectrum obtained in J-PARC is found to change from a low-*T* static behavior to a high-*T* dynamic behavior above around 300 K. This is consistent with the fact that Na^+ ions are extracted from and intercalated into the Na_xFePO_4 lattice, reversibly, while there is no NMR study on Na-diffusion in Na_xFePO_4 due to large Fe moments.

References

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