

RESEARCH ARTICLE

Rate dependence of the reaction mechanism in olivine NaFePO₄ Na-ion cathode material

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Summary

When electrode materials are driven away from equilibrium conditions, significant differences occur in their (dis)charge mechanism. In this paper, the changes in the phase transformations of the olivine NaFePO₄ are examined as a function of the cycling rate from the thorough analyses of both the voltage-composition profiles of galvanostatic cycling, and *operando* laboratory and synchrotron X-ray diffraction experiments. While the charge mechanism remains unchanged at all C-rates, high cycling rates enable to unveil 2 concomitant biphasic reactions appearing as a 3-phase state at lower rates. This finding allows rationalising the asymmetries observed at low rates, which are rooted in different reaction kinetics.

KEYWORDS

NaFePO₄, Na-ion batteries, olivine, *operando* XRD, reaction mechanism