

Improving Electrochemical Activity of P2-type $\text{Na}_{2/3}\text{Mn}_{2/3}\text{Ni}_{1/3}\text{O}_2$ by Controlling its Crystallinity



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Invited for this month's cover picture is the work of Dr. Kataoka, Dr. Taguchi, Dr. Tada and Dr. Takeichi at AIST and Dr. Machida at QST. The cover picture shows that the charge-discharge cycle characteristics have been improved by reducing the particles size of the layered compound $\text{Na}_{2/3}\text{Mn}_{2/3}\text{Ni}_{1/3}\text{O}_2$ to the several nm level. Read the full text of the Research Article at 10.1002/batt.202200462.

What prompted you to investigate this topic/problem?

Main reason for the cycle degradation of a layered oxide materials (Na_xMO_2) for the sodium-ion battery is the structural change in the layered structure during charging and discharging. We focused on controlling crystallinity as another approach to improve cycle stability of this kind of material, since we found in our previous studies that the structural change from unstable phase to stable phase can be restricted by reducing the crystallite size. Therefore, we thought that we could improve the cycling stability of the Na_xMO_2 by reducing the crystallite size (or crystallinity).

What is the most significant result of this study?

The most significant achievement is the finding that charge-discharge properties can be improved by decreasing the crystallinity of layered compounds. Generally, it is known that ball milling of layered compounds used for electrode materials causes cation mixing, which results in deterioration of charge-discharge properties, and therefore it has been difficult to evaluate the charge-discharge properties of nanometer-order fine crystals. $\text{Na}_{2/3}\text{Mn}_{2/3}\text{Ni}_{1/3}\text{O}_2$, which was the subject of this study, hardly undergoes mixing by milling, and thus the present results were obtained.

Batteries & Supercaps

Front Cover:
R. Kataoka and co-workers
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