Development of NCA cathode material with enhanced gelation resistance

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In recent years, lithium ion batteries have been expanding their application to Electric Vehicles (EV) and Energy Storage System (ESS), and therefore, higher energy density and larger capacities are required. Ternary cathode materials that have been used in many applications up to the present have realized charge and discharge characteristics suitable for various applications by changing the molar ratio of three transition metal elements consisting of Ni, Co, and Mn [1]. Until now, cathode materials with a transition metal element molar ratio of 1: 1: 1 have been mainly used [2]. However, Ternary cathode materials such NCM622 and NCM811 [3] which increased amount of Ni and at the same time reduced Co content and $Li(Ni,Co,Al)O_2$ (NCA) [4,5] has been developed in view of high capacity and material costs. For improvement of energy density, the application of High-Ni based cathode material (NCM811, NCA) showing high capacity of over 200 $mAh \cdot g^{-1}$ attracts attention, and movements towards adoption are active. However, the slurry of the high capacity cathode material tends to gelate the PVdF binder and it is difficult to manufacture the electrode. In this study, we analyzed the gelation factor of slurry using NCA and succeeded in suppressing the slurry gelability in NCA which the causative alkaline substance was removed (Fig. 1.). Also in the study assuming the production environment of various humidity, the NCA cathode material suppressing gelation showed stable slurry characteristics.

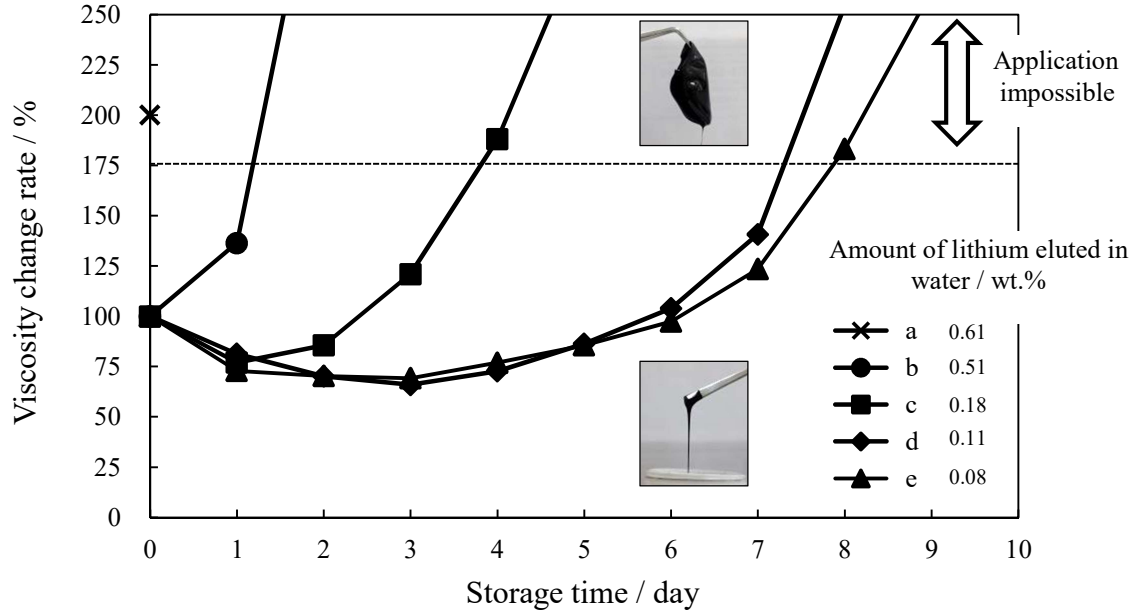

Fig. 1. Viscosity change in storage time of the NCA electrode slurry.

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