



TAIHEIYO CEMENT NEWS LETTER

February 25, 2021

Taiheiyo Cement Developed Nanolitia[®], a New Lithium-ion Battery Cathode Material

Taiheiyo Cement Corporation (Headquarters: Bunkyo-ku, Tokyo; President: Masafumi Fushihara) is pleased to announce that it has developed Nanolitia[®], a new compound of lithium manganese iron phosphate for lithium-ion battery cathodes, that is expected to provide a higher reliability and a longer life compared to the current mainstream cathode materials containing nickel and cobalt.

Materials containing nickel and cobalt are now in mainstream use for lithium-ion battery cathodes for the reason of their high capacity, but their reliability has been an issue because there is a high risk of fire when mechanically damaged or overcharged. Meanwhile, the lithium-ion battery cathode material market is expected to grow on a global basis. In order to reduce CO₂ emissions, we have to urgently promote the shift to electric vehicles and renewable energy sources, including wind and solar. There will be a tremendous increase in the use of lithium-ion batteries as their main power storage systems.

In view of such background, Taiheiyo Cement has worked on developing a lithium-ion battery cathode material that does not use rare cobalt as a raw material. Nanolitia is a new cathode material based on lithium manganese iron phosphate (Photo 1). Our unique hydrothermal synthesis technology has enabled the synthesis of nano-sized uniform particles (Photo 2), and the electrical conductivity of the material has been improved by the original carbon coating technology. As a result, the new material can perform at its full potential (Figure 1), which has been impossible with the conventional lithium manganese iron phosphate. Nanolitia has an extremely high reliability due to its excellent thermal stability, as well as a high capacity. In addition, its low inclusion of impurities allows expectations for a longer life and a shorter charging time. Different from conventional lithium iron phosphate materials on the market as cobalt-free cathode materials, our new product has the same voltage as existing cathode materials containing nickel and cobalt. This allows Nanolitia to be used either as a single-element cathode material, or in mixture with the existing materials to improve reliability without affecting the electrochemical performance.

A demonstration plant for Nanolitia with an annual output of 100 tons is currently under construction at our Central Research Laboratory in Sakura City, Chiba Prefecture. The plant will be completed and put into operation by the end of fiscal year 2021, and various activities will start toward full commercialization of Nanolitia.

We will make a full effort to establish the production technology and achieve the commercialization of Nanolitia at the earliest possible time, so that we can contribute to the CO₂ emissions reduction through the supply of the material for lithium-ion batteries. Taiheiyo Cement will continue to carry out our business activities in harmony with not only economic development but also environmental considerations and social contributions, thereby leading the way to a sustainable global future as stated in the mission of the corporate group.



Photo 1. Appearance of Nanolitia

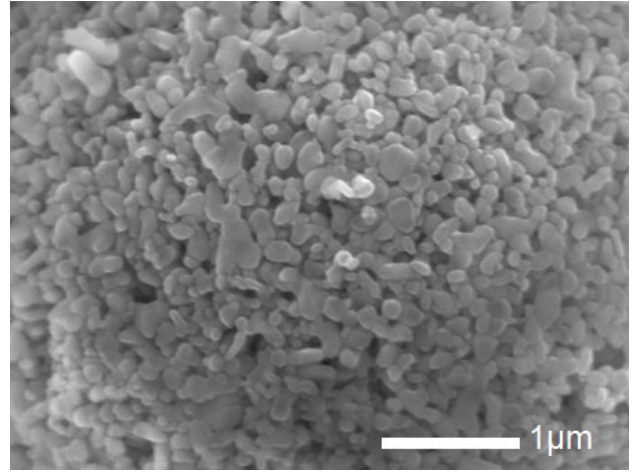


Photo 2. Electron microscope image of Nanolitia

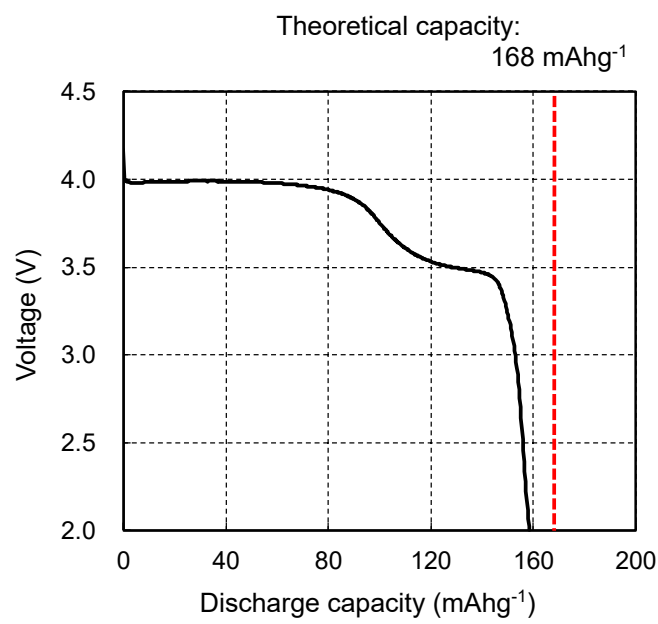


Figure 1. Discharge curve of Nanolitia. The discharge capacity of Nanolitia is 95% of the theoretical value, where that of the conventional lithium manganese iron phosphate reported in literature is below 90%.

Note: Nanolitia[®] is a registered trademark of Taiheiyo Cement Corporation.