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Zeon Collaborates with Waseda University in Establishing Technology for Visualizing Separators to Test the Safety of Lithium-Ion Rechargeable Batteries

Expected to Further Improve Safety of Lithium-Ion Rechargeable Batteries

Zeon Corporation

Zeon Corporation (head office: Chiyoda-ku, Tokyo, President and CEO: Kimiaki Tanaka) has contributed to establishing a technology for visualizing separators in collaboration with the Research Organization for Nano & Life Innovation of Waseda University in its nail penetration test*¹ (short-circuit safety test) for lithium-ion batteries (LIBs).

Separators are major components inside LIBs placed between the cathode and anode to ensure lithium ion conductivity while preventing short circuits between the electrodes. Recent attention to technologies for LIB safety has been particularly focused on expectations for an improvement of the thermal properties and strength of the separators as well as verifying the mechanism behind their performance. In the latest development, operando observation*² of the nail penetration test was achieved using a separator visualization technology jointly developed with Waseda University's Research Organization for Nano & Life Innovation. The technology will clarify the role and function of separators and thereby lead to improving the LIB safety.

Details of the technology will be presented at the 63rd Battery Symposium, to be held at the Fukuoka International Conference Center on November 10.

At the Battery Symposium, Zeon and Waseda University's Research Organization for Nano & Life Innovation will deliver a joint presentation titled, "Operando Analysis of LIB with Visualized Separator Inside during Internal Short-Circuit Test using High-Speed and High-Precision X-ray Inspection System" The technology involves coating the surface of a separator with metal oxide particles and using large X-ray scattering cross sections to visualize the behavior of the separator during short circuit safety testing through direct observation with an X-ray scanner. This is expected to clarify the role and function of separators in battery safety and accelerate the development of separator materials, which until now has depended on analyzing the electrode short circuit phenomenon inside LIB cells and the initial process of thermal runaway during short circuit safety tests.

Zeon has been refining its technology for coating materials onto the surface of separators and has established a proven track record based on having developed adhesives for battery separators (product name: AFL®). In this latest achievement, the technology was applied to coat oxide particles under optimal conditions, facilitating visualization while maintaining separator functionality. The application's success has allowed Zeon to further contribute to improving LIB safety and gain more advanced material coating technology.

Zeon intends to strengthen its battery materials through its strategy of "polishing up" existing businesses, as stated in its Medium-Term Business Plan. It will therefore continue to develop its business and technologies to further strengthen these materials and contribute to improving LIB safety while also contributing to the technological development of LIBs in collaboration with the Research Organization for Nano & Life Innovation of Waseda University and other companies.

*1 A typical LIB safety test, in which a nail is inserted into the LIB to evaluate its resistance to internal short circuits.

*2 Direct observation of phenomena occurring during testing.

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