Novel Surface Analysis Technique using Impedance-SPM: Characterization of the Surface Groups on the Non-Conductive Nanoparticles

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Impedance-SPM is a useful tool to characterize topological and electrical properties, such as inductance and capacitance, of non-conducting materials. By monitoring the impedance responses with respect to the applied AC current, the capacitance of the target material can be identified. The obtained impedance signal is influenced by the surface functional groups. Several model nanoparticles were prepared, and their impedance signal was compared with the known functionality. The surface functionality was also characterized through the conventional colloidal techniques. When analyzing this signal, the electric circuit model was determined through trial and error, and hen the surface factionality was characterized. In conclusion, as surface group changes, impedance signal also changes. This technique is expected to contribute to the nanoparticle technology by providing information on the surface functional groups.