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Probing Battery Black Mass: From Nanostructure to Surface Area

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Abstract: Efficient recycling of lithium-ion batteries requires a deeper understanding not only of the chemical composition of black mass, but also of its physical structure and processing behavior. This presentation will demonstrate how a multimethod analytical approach combining X-ray diffraction, small-angle X-ray scattering, gas adsorption, particle characterization, density measurements, and powder rheology can reveal the influence of thermal pretreatment on phase composition, nanoscale interfaces, porosity, surface accessibility, and powder flowability. Based on recently published research involving industrial black mass samples, the talk will highlight how complementary analytical techniques can support feedstock assessment, process optimization, and the development of more reliable and sustainable battery-recycling processes.

Keywords: *Black mass, Lithium-ion battery recycling, Small-angle X-ray scattering, Powder rheology, Specific-surface analysis.*