MULTI-SCALE CHARACTERIZATION OF ELECTRONIC AND IONIC LIMITATIONS TO POWER PERFORMANCE OF COMPOSITE ELECTRODES

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Blending different active materials is an approach followed by several automotive battery suppliers intended to optimize the performance of the battery with respect to the automotive operating requirements.

In this communication, the 3D morphology of pure NMC, pure LFP and blended NMC/LFP electrode is characterized by both synchrotron X-ray tomography and FIB/SEM tomography for rational interpretation of their electrical properties and electrochemical performance.

Their electrical properties are measured by broad band dielectric spectroscopy, which allows to discriminate the contact resistance at the electrode/current collector interface and the electrode through-thickness electronic conductivity, both in the dry and the wet state (infiltrated by the liquid electrolyte) [1-3].

The rate performance is shown to be critically influenced by the inter-connectivity between the active mass and the CB+PVdF conductive network, and by the porosity tortuosity.

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[2] K. A. Seid, J. C. Badot, O. Dubrunfaut, M. T. Caldes, N. Stephant, L. Gautier, D. Guyomard and B. Lestriez, "Multiscale electronic transport in Li_{1+x} $Ni_{1/3-u}$ $Co_{1/3-v}$ $Mn_{1/3-w}O_2$: a broadband dielectric study from 40 Hz to 10 GHz", *Phys. Chem. Chem. Phys.*, 2013, 15, 19790.

[3] K-A. Seid, J-C. Badot, C. Perca, O. Dubrunfaut, P. Soudan, D. Guyomard, B. Lestriez. "In-situ multiscale study of ion and electron motions in a lithium-ion battery composite electrode", *Adv. Energy Mater*, 2015, 5, 1400903