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Neutron powder diffraction studies of prismatic Li-ion cell

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Li-ion batteries are playing an important role in powering portable devices, e-mobility applications and off-grid energy storage. Recently we showed that a neutron powder diffraction pattern taken on cylindrical cells like 18650-type can be successfully refined using a contribution from the positive and negative electrodes, current collectors and cell housing. Due to their rollover design the cylinder-type Li-ion cells are relatively difficult for lab manufacturing, i.e. contain numerous issues regarding reproducibility, current and electrolyte distribution etc. From the ergonomic point of view, the prismatic cells supply improved stacking/volumetric density, when compared to cylinder ones. This along with the increasing interest of cell manufacturers to the cells in prismatic shape in both low and high current applications inspired us to start the thorough characterization of the cells in this type using high-resolution neutron powder diffraction. In the current contribution three different approaches for the measurements of prismatic cells will be presented, i.e. fixed position, pseudo rotation and constant rotation. Besides this an application of rotation setup upon in situ/in operando conditions will be reported for the first time and compared to the behavior of 18650-type cell.

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