

## Novel *in-situ* neutron diffraction cell for battery materials

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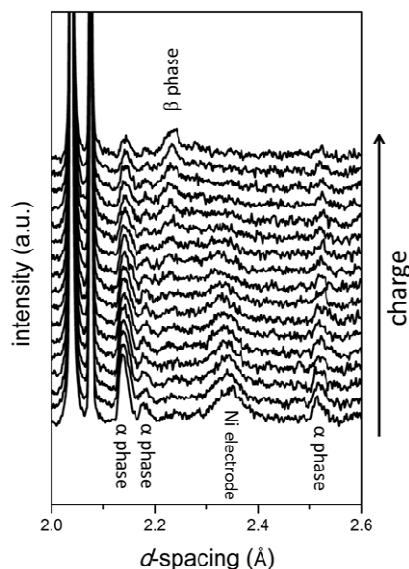
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A novel *in-situ* neutron diffraction cell has been constructed to monitor the structural changes at the electrodes in secondary batteries during charge/discharge cycling. The new cell is based on the coin cell geometry and it has larger dimensions compared to commercial batteries. The cell design allows two possible configurations in order to increase the amount of electrode material exposed to the neutron beam. Initial electrochemical tests using a Nickel-metal-hydride battery (NiMH) show that the cell is able to deliver 90% of its capacity at relevant current rates C/12. Preliminary neutron diffraction patterns show that data of sufficient statistical quality for analysis using the Rietveld refinement method can be collected. Using Ni(OH)<sub>2</sub> and AB<sub>5</sub>-type alloy as the positive and negative electrodes, respectively, we have been able to observe changes in the neutron diffraction patterns as a function of the charge state, see below.



Neutron diffraction patterns for a NiMH battery collected *in-situ*