

# In operando neutron diffraction and tomography on Li-ion cells

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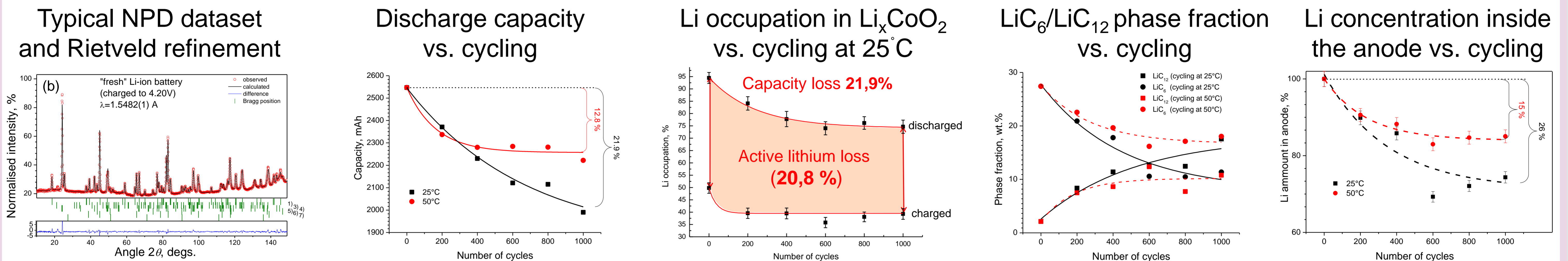
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## Effect of fatigue on crystal structure of electrode materials

O. Dolotko, A. Senyshyn, M. J. Mühlbauer, K. Nikolowski, F. Scheiba, H. Ehrenberg, J. Electrochem. Soc. 159(12) (2012) A2082-A2088

Two batches of Li-ion cells were cycled (CCCV, 1C) 200, 400, 600, 800 and 1000 times at 25 °C and 50 °C

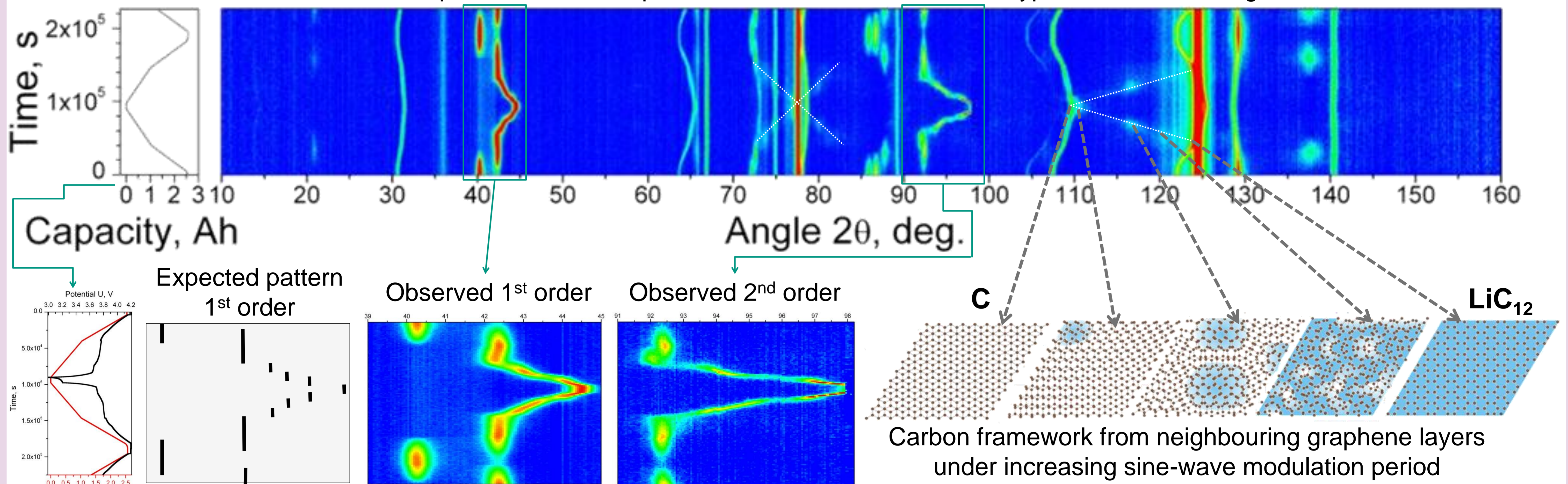


## High-resolution monochromatic neutron powder diffraction

A. Senyshyn, O. Dolotko, M. J. Mühlbauer, K. Nikolowski, H. Fuess, H. Ehrenberg, J. Electrochem. Soc. 160(5) (2013) A3198-A3205

In operando experiment carried out at the instrument SPODI (FRM-II) at  $\lambda=1.5482 \text{ \AA}$  in Debye-Scherrer geometry using a multidetector array.

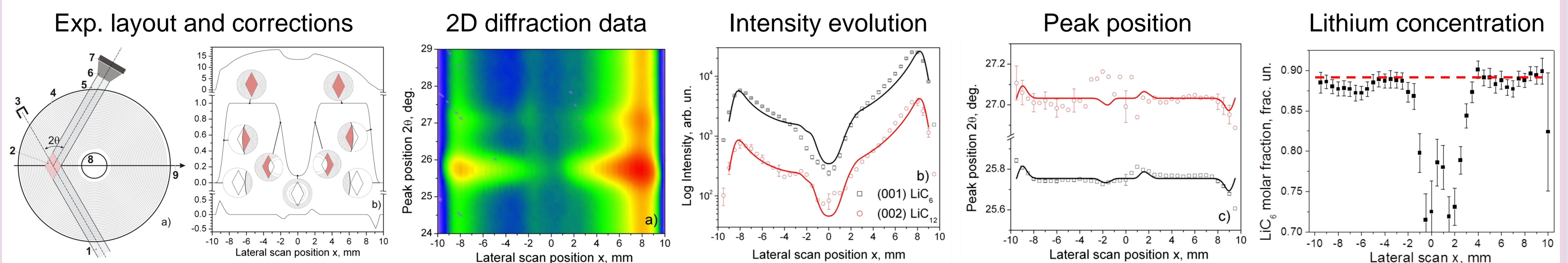
Neutron powder diffraction patterns from Li-ion cell of 18650-type vs. state-of-charge



## Spatially-resolved neutron powder diffraction on 18650-type cell

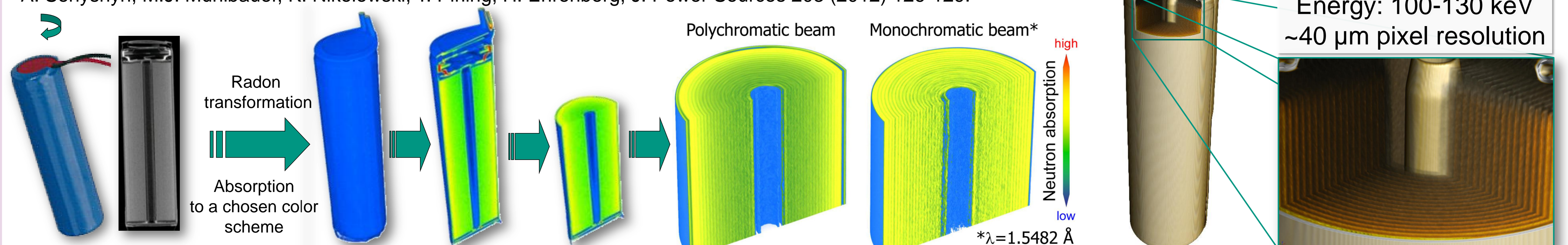
A. Senyshyn, M.J. Mühlbauer, O. Dolotko, M. Hofmann, T. Pirling, H. Ehrenberg, J. Power Sources 245 (2014) 678-683

Experimental parameters for the in-situ measurements at STRESS-SPEC (FRM-II):  $\lambda=1.64 \text{ \AA}$ , gauge volume:  $2 \times 2 \times 20 \text{ mm}^3$



## Neutron tomography ANTARES (FRM-II), FOV 100x100 mm<sup>2</sup>, ~100 μm pixel resolution

A. Senyshyn, M.J. Mühlbauer, K. Nikolowski, T. Pirling, H. Ehrenberg, J. Power Sources 203 (2012) 126-129.



This work was supported by Deutsche Forschungsgemeinschaft, Research Collaborative Center 595 "Electrical Fatigue in Functional Materials".

