

**MS14-2-5 Temperature and pressure stability of Li graphite intercalation compounds  
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V. Baran <sup>1</sup>, T. Hölderle <sup>2</sup>, A. Méndez <sup>1</sup>, A. Senyshyn <sup>2</sup>

<sup>1</sup>Deutsches Elektronen-Synchrotron (DESY) - Hamburg (Germany), <sup>2</sup>Research Neutron Source Heinz Maier-Leibnitz (FRM II), Technical University of Munich - Garching (Germany)

**Abstract**

Nowadays, Li-ion batteries (LIBs) are dominating the electric energy storage market: powering electric vehicles, mobile devices, power tools, and off-grid storage systems. Modern Li-ion batteries, in the majority, use graphite as anode material due to its layered structure that allows relatively easy intercalation of species between them. Graphite intercalation compounds (GIC) have been known for some time and intensively studied but are still missing structure and properties data about some of the representatives [1, 2]. From this perspective, Li GICs have much attention to their synthesis, structure, and thermodynamic stability, with some controversial or inconsistent data, particularly temperature and pressure stability.

In the current contribution, we would like to present investigations on the temperature and pressure stability of Li GICs employing synchrotron X-ray diffraction. The temperature stability regime was investigated for a powder sample of  $\text{Li}_x\text{C}_6$  ( $x = 0-0.9$ ) extracted from LIB with high energy X-rays (60 keV) at the P02.1 beamline, PETRA III (DESY), in the temperature range from 180 K to 500 K. The pressure stability of  $\text{Li}_x\text{C}_6$  ( $x = 0.7$ ) was investigated at room temperature using a hydrostatic high-pressure cell [3] in the pressure range from 0 to 4000 bars.

**References**

- [1] M. S. Dresselhaus and G. Dresselhaus, "Intercalation compounds of graphite", *Adv. Phys.*, 51:1, 1-186 (2002)
- [2] E. Morinobu, M.S. Suzuki and T. Enoki. "Graphite Intercalation Compounds and Applications." (2003)
- [3] F. J. Wirkert, M. Paulus, J. Nase, J. Möller, S. Kujawski, C. Sternemann and M. Tola, "X-ray reflectivity measurements of liquid/solid interfaces under high hydrostatic pressure conditions", *J. Synchrotron Rad.* 21, 76-81 (2014)