Contribution ID: **45** Type: **Oral Presentation**

Operando XRD as an essential tool to unravel the electrochemical mechanisms of FeNb11O29, anode for LIBs

Wednesday, November 29, 2023 4:20 PM (30 minutes)

Niobium-based oxides were recently proposed as new anode materials for advanced Lithium-Ion Batteries (LIBs) [1], due to very high theoretical capacities and high working potential that can prevent the formation of lithium dendrites, increasing the battery safety. Most of them crystallizes in open Wadsley–Roth shear structures, which show large Li-ion diffusion coefficients and promising applications in energy storage systems [2]. The results of the application of in situ Raman Spectroscopy, operando X-Ray Diffraction (Figure 1) and electrochemical techniques to unravel the complex structural and electrochemical features of FeNb11O29 will be discussed [3]. The intrinsic pseudocapacitance shown by the iron niobate is correlated to the large channels of the structure that cause weak Li+-host interactions and very little charge- transfer resistances. The symmetrisation of the octahedral framework that occurs after the reduction of Nb5+ cations, detected for the first time, seems to be the key of the electrochemistry of FeNb11O29, which shows excellent features for advanced high-power density LIBs.

[1] I. Pinus, M. Catti, R. Ruffo, M.M. Salamone, C.M. Mari. Chem. Mater. 2014, 26, 2203. DOI: 10.1021/cm500442j
[2] D. Spada, I. Quinzeni, M. Bini, Electrochimica Acta 2019, 296, 938. DOI: 10.1016/j.electacta.2018.11.047
[3] D. Spada, B. Albini, P. Galinetto, D. Versaci, C. Francia, S. Bodoardo, G. Bais, M. Bini, Electrochim. Acta 2021, 393, 139077. DOI: 10.1016/j.electacta.2021.139077.

Primary authors: Prof. BINI, Marcella (University of Pavia, Chemistry Department); Dr SPADA, Daniele; Dr AMBROSETTI, Marco; Dr ALBINI, Benedetta; Prof. GALINETTO, Pietro

Presenter: Prof. BINI, Marcella (University of Pavia, Chemistry Department)