

Engineering of Sn and pre-lithiated Sn as negative electrode materials coupled to garnet Ta-LLZO solid electrolyte for all-solid-state Li batteries

Giulio Ferraresi^{*[a]}, Sven Uhlenbruck^[b], Chih-Long-Tsai^[b], Petr Novák^[a] and Claire Villevieille^{*[a,c]}

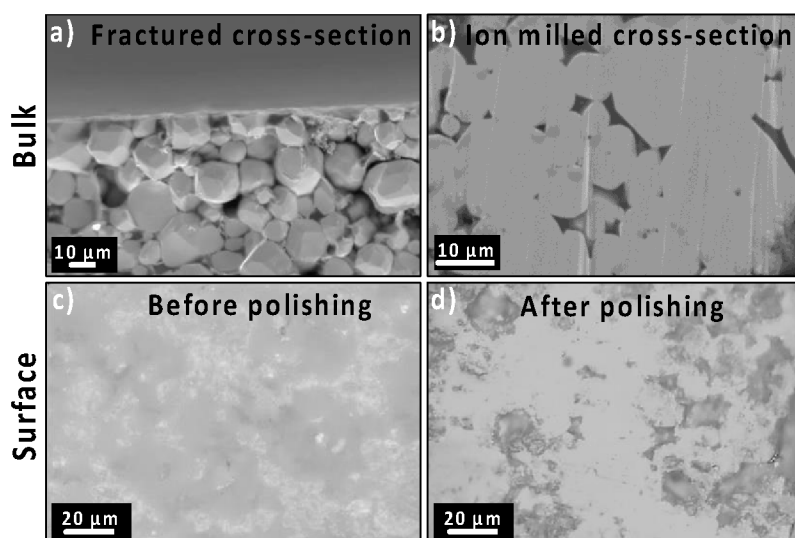


Figure S1. SEM images of LLZTa samples: a) manually “fractured” cross-section, b) “ion-milled” cross-section, c) surface of the LLZTa pellet before polishing, d) surface of the LLZTa pellet after polishing.

[a] Dr. Giulio Ferraresi, Prof. Dr. Petr Novák, Dr. Claire Villevieille
Paul Scherrer Institute, Electrochemistry Laboratory, CH-5232
Villigen PSI, Switzerland
Email: giulioferraresi@gmail.com

[b] Dr. Sven Uhlenbruck, Dr. Chih-Long Tsai
Forschungszentrum Jülich GmbH, Institute of Energy and Climate
Research, Materials Synthesis and Processing (IEK-1), 52425
Jülich, Germany

[c] Dr. Claire Villevieille
Université Grenoble-Alpes, Grenoble INP, LEPMI Laboratory, 1130
rue de la piscine, 38402 St Martin d'Hères, France
E-mail: claire.villevieille@gmail.com

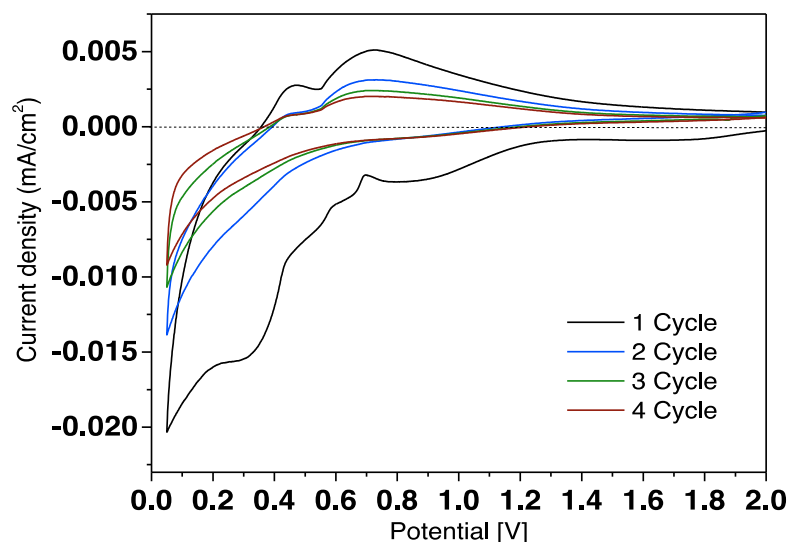


Figure S2. CV of a Sn composite electrode with 100 nm particles vs. Li metal at scan rate of 50 $\mu\text{V/s}$.

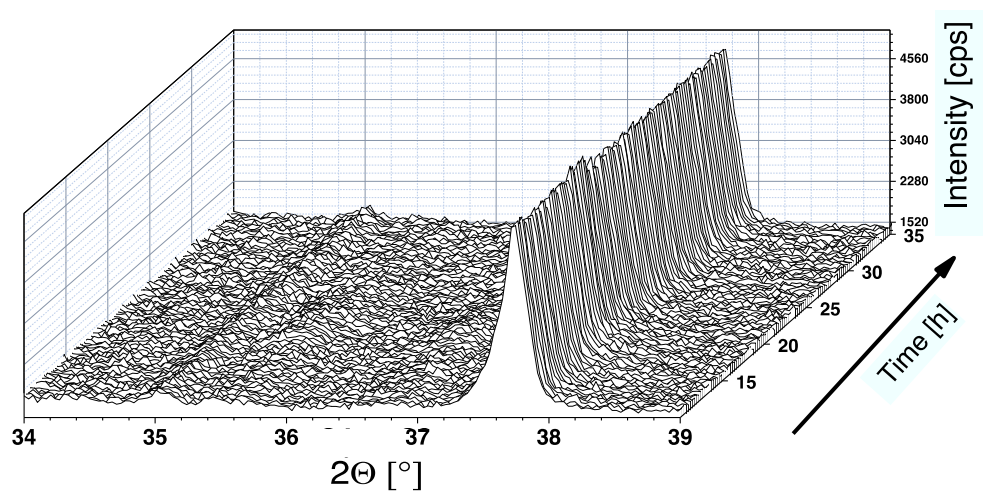


Figure S3. Waterfall representation of selected 40-140 scans (corresponding to 10-35 h) extracted from the *operando* XRD measurement of an Sn composite electrode coated on LLZTa and cycled vs. Li metal at 90 °C in the potential range 0.2 – 1.6 V vs. Li^+/Li at C/50 rate