

**ADVANCED
MATERIALS**
INTERFACES

Supporting Information

for *Adv. Mater. Interfaces*, DOI: 10.1002/admi.202000164

Toward an All-Ceramic Cathode–Electrolyte Interface with
Low-Temperature Pressed NASICON $\text{Li}_{1.5}\text{Al}_{0.5}\text{Ge}_{1.5}(\text{PO}_4)_3$
Electrolyte

*Andrea Paoella, Wen Zhu, Giovanni Bertoni, Alexis Perea,
Hendrix Demers, Sylvio Savoie, Gabriel Girard, Nicolas
Delaporte, Abdelbast Guerfi, Mathias Rumpel, Henning
Lorrmann, George P. Demopoulos, and Karim Zaghib**

Toward an all-ceramic cathode-electrolyte interface with low-temperature pressed NASICON $\text{Li}_{1+x}\text{Al}_x\text{Ge}_{2-x}(\text{PO}_4)_3$ electrolyte

Andrea Paoletta^a, Wen Zhu^a, Giovanni Bertoni^{b,c}, Alexis Perea^a, Hendrix Demers^a, Sylvio Savoie^a, Gabriel Girard^a, Nicolas Delaporte^a, Abdelbast Guerfi^a, Mathias Rumpel^d, Henning Lorrmann^d, George P. Demopoulos^e, and Karim Zaghib^{a,*}

^aHydro-Québec, Center of Excellence in Transportation Electrification and Energy Storage, Varennes, Québec J0L 1N0, Canada

^bIMEM-CNR, Istituto dei Materiali per l'Elettronica e il Magnetismo, Parco Area delle Scienze 37/A, I-43124 Parma, Italy

^cCNR-Istituto Nanoscienze, Via Campi 213/A, I-41125 Modena, Italy

^dFraunhofer-Institut of Silicate Research ISC, Neunerplatz 2, 97082 Würzburg, Germany

^eMcGill University, Materials Engineering Department, 3610 Rue University, Montréal, QC H3A 0C5, Canada

*Corresponding author: zaghib.karim@ireq.ca

SUPPORTING INFORMATION

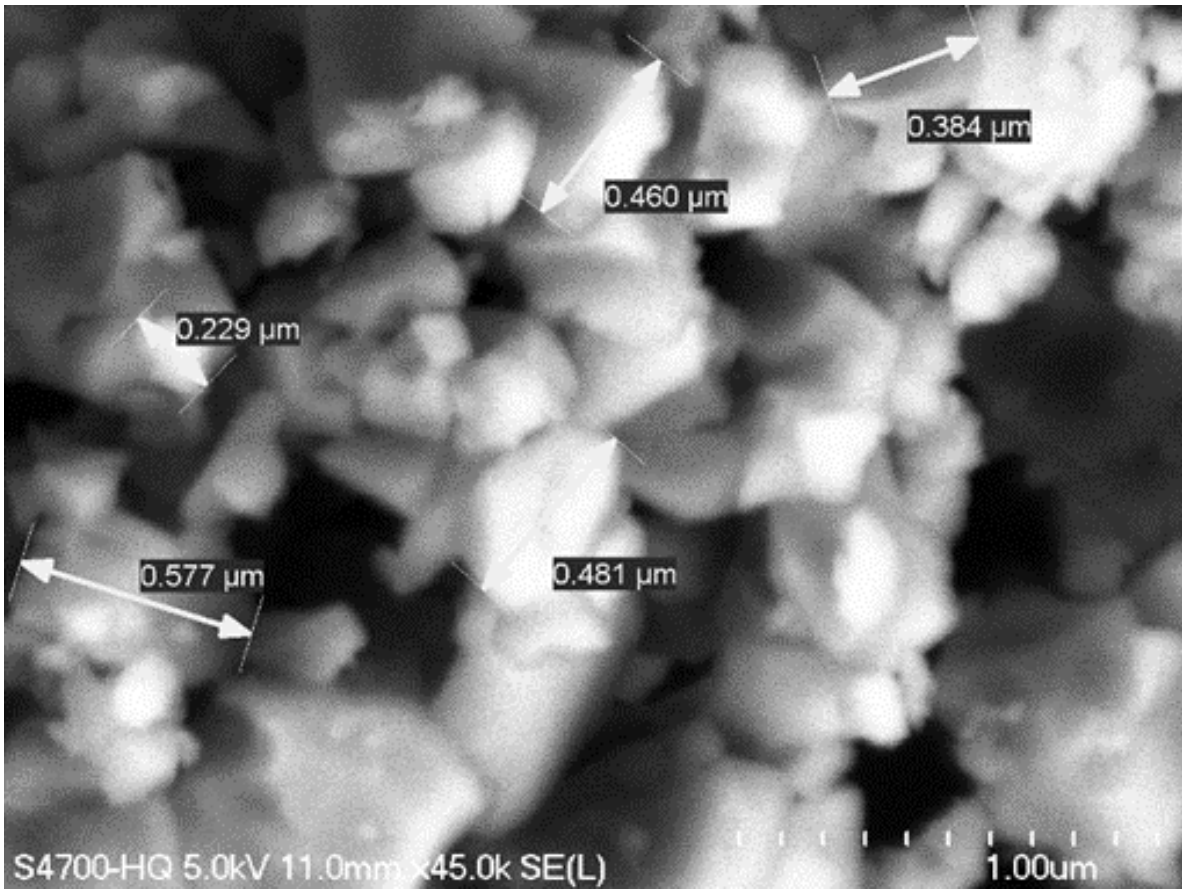


Figure S1: SEM image of LAGP powder before hot pressing sintering

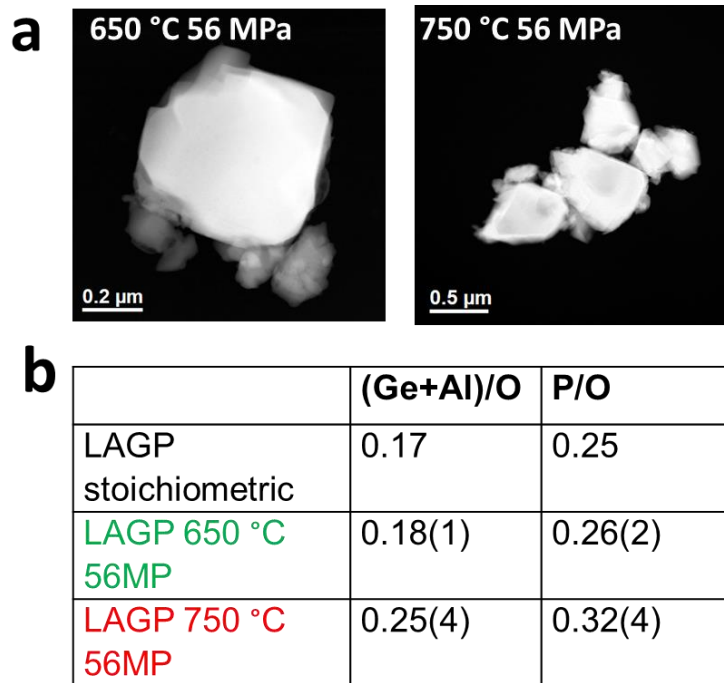


Figure S2: a) STEM images of LAGP annealed at 650 °C and 56 MPa and at 750 °C and 56 MPa; b) STEM-EDXS quantification of ratios of Ge, Al cations, and P atoms with respect to oxygen for two samples compared with expected values from pure stoichiometric $\text{Li}_{1.5}\text{Al}_{0.5}\text{Ge}_{1.5}(\text{PO}_4)_3$ (LAGP). Mean values were obtained from several crystals (>10) and errors are given as standard deviations. The sample at 650 °C shows very good agreement with the expected values, while the sample at 750 °C shows higher ratios due to a lower amount of oxygen, in agreement with the oxidation-state reduction noticed from the XPS results.

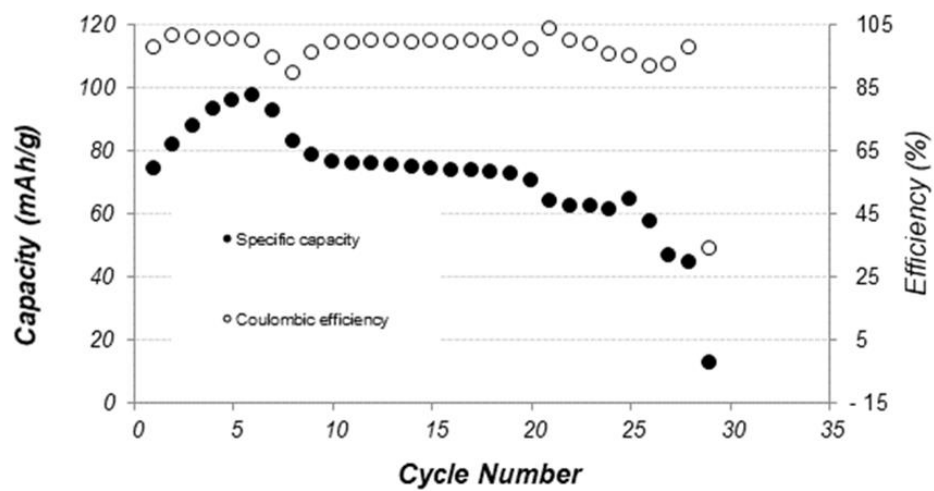
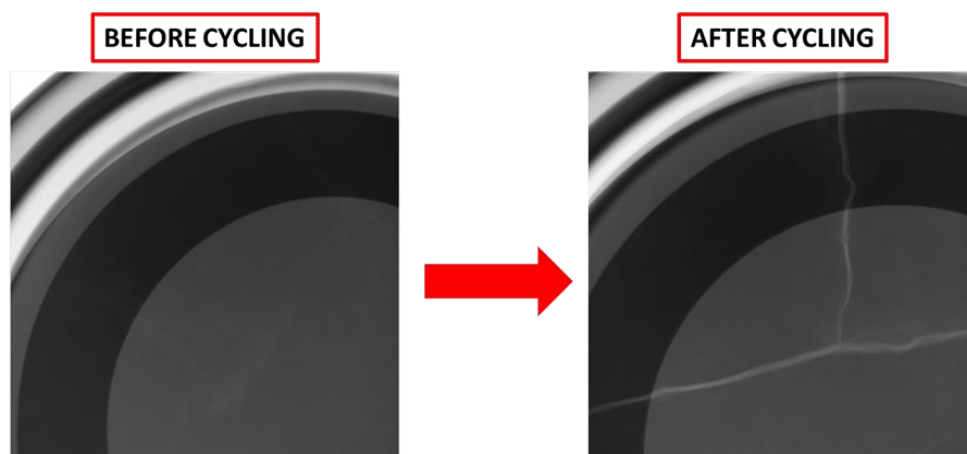
a**b**

Figure S3: a) cycling performance of LiFePO₄-LAGP-graphite//LAGP//Li metal at C-rate of C/24;
b) CT-scan of the cell before and after cycling at C-rate of C/24