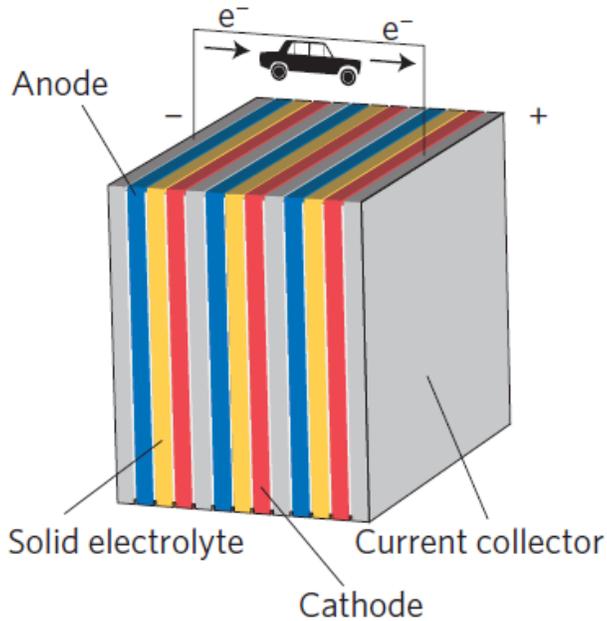




Boğaziçi University

Dr. Gülin Vardar

Solid State Battery Interfaces



Hu, Y.-S. Batteries: Getting Solid. *Nat. Energy* 1 (2016).

Fabrication, **currently costly.**

Stacked configuration

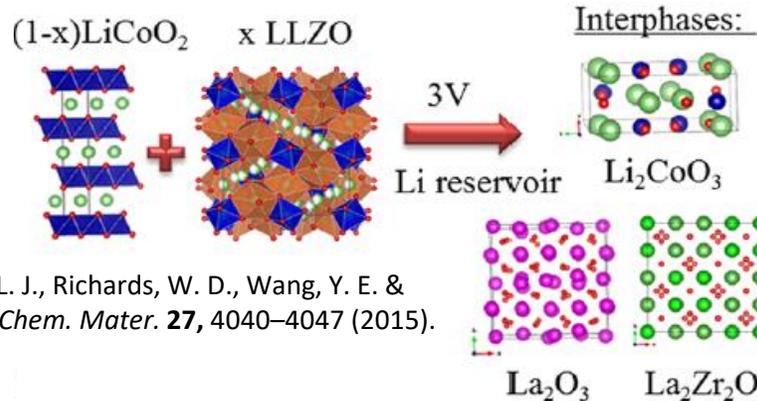
- Hot-press
- Thin-film
- Slurry paste

+ **high-T sintering**

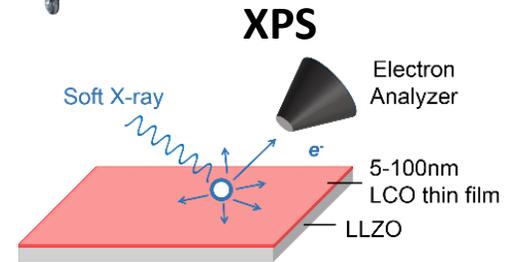
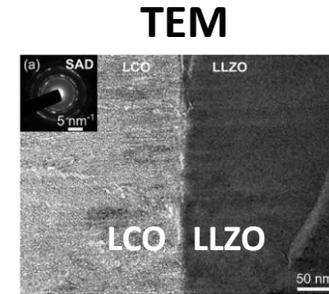
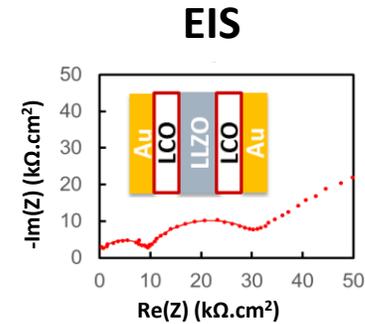
“the principal hurdle for developing successful solid-state batteries for EVs is in **minimizing the interfacial impedances between the SSE and the electrodes**”

Luntz, A. C., Voss, J. & Reuter, K. *J. Phys. Chem. Lett.* 6, 4599–4604 (2015).

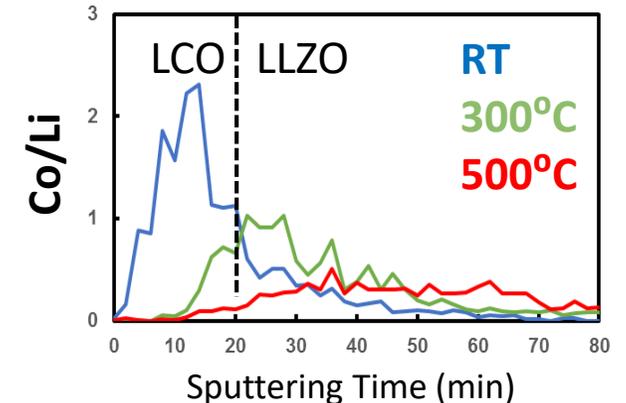
Our research focuses on revealing the reactions at the interfaces in solid-state batteries and minimizing interfacial impedances



Miara, L. J., Richards, W. D., Wang, Y. E. & Ceder, G. *Chem. Mater.* 27, 4040–4047 (2015).



Compositional depth profiling (XPS, SIMS, TEM)



Ongoing research: Cold Sintering

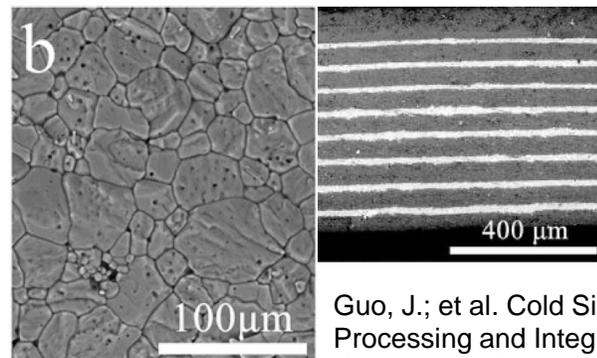
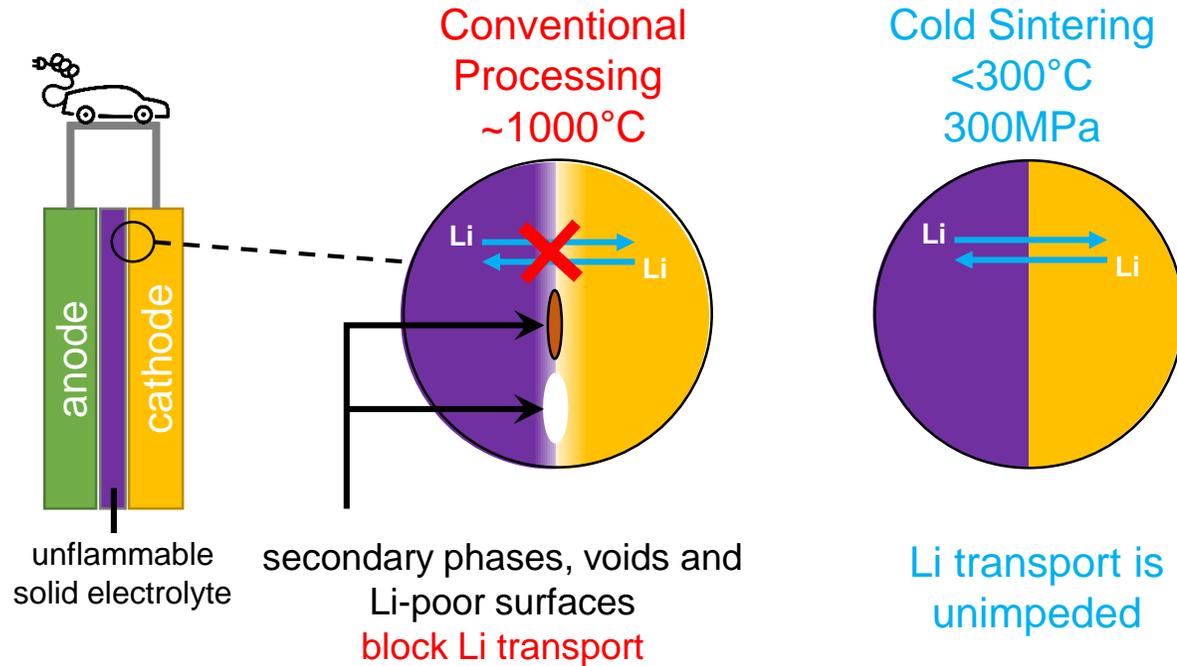
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- TÜBİTAK (2232)
- Boğaziçi University (Start-up grant)
- MISTI (Boğaziçi-MIT) grant
 - with Prof. Bilge Yıldız at MIT

Completed research:

«Control of Interfaces for Increasing the Power Density and Durability of Solid State Batteries»

with Prof. Bilge Yıldız (MIT)



«Cold Sintering» can bond oxides with oxides (or metals) at low temperatures and therefore result in low interfacial impedance.

Guo, J.; et al. Cold Sintering: A Paradigm Shift for Processing and Integration of Ceramics. *Angew. Chemie Int. Ed.* **2016**, 55 (38), 11457–11461.

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