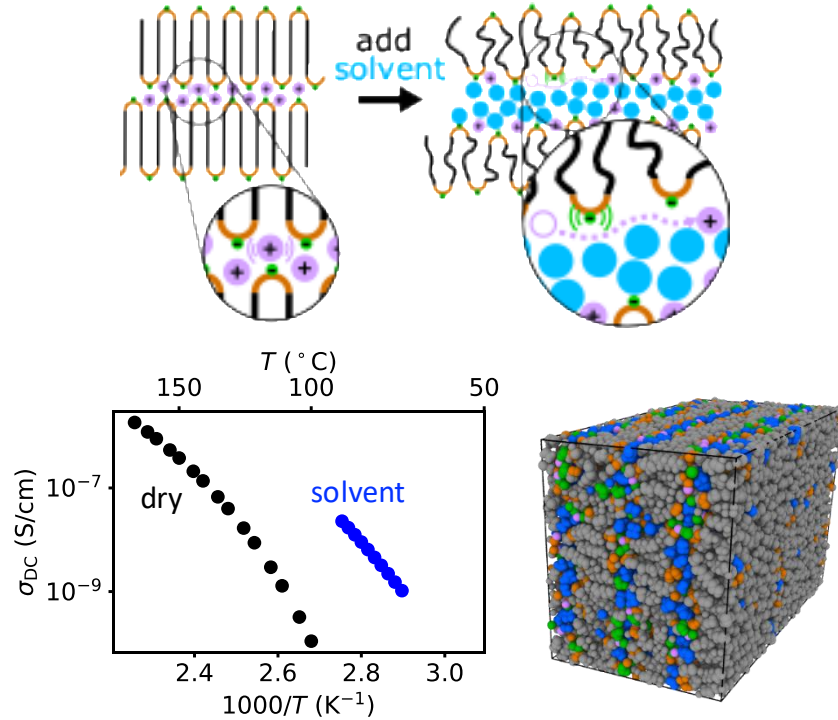


Added Solvent Enhances Lithium Ion Conductivity in Polymer Electrolytes



An ionic multiblock polymer that forms layers (top left, Li^+ in purple) can be swollen with solvent (blue, top right) which enables higher Li^+ conductivity (blue, bottom left). Simulations reveal the Li transport mechanism (bottom right).

Scientific Achievement

Swelling a multiblock lithium-ion-conducting polymer with ethylene carbonate solvent increases the Li conductivity by over 4 orders of magnitude compared to the dry polymer.

Significance and Impact

This work demonstrates that adding small amounts of solvent can improve conductivity in polymer electrolytes, which could be used in safer and higher energy density batteries.

Research Details

- Broadband dielectric spectroscopy, X-ray scattering, and atomistic molecular dynamics simulations were used to determine the effects of added solvent
- Simulations showed lithium ions are typically only partially solvated by the added solvent and move along the polymer-solvent interface

Vigil, D. L.; Ferko, B. T.; Saumer, A.; Mecking, S.; Stevens, M. J.; Winey, K. I.; Frischknecht, A. L. Partial Solvation of Lithium Ions Enhances Conductivity in a Nanophase-Separated Polymer Electrolyte. *Chemistry of Materials* **2024**, 36 (19), 9970–9979.

Work was performed in part at the Center for Integrated Nanotechnologies