LiGa(OTf)₄ as an Electrolyte Salt for Li-Ion Cells
This salt could improve rechargeable lithium-ion cell performance.

NASA's Jet Propulsion Laboratory, Pasadena, California

LiGa(OTf)₄, a colorless crystalline solid. The LiGa(OTf)₄ and the other salts were incorporated into solutions with PC and DMC. The resulting electrolyte solutions exhibited reasonably high ionic conductivity over a relatively wide temperature range down to −40 °C (see figure). In cyclic voltammetry measurements, LiGa(OTf)₄ and the other salts exhibited acceptable high electrochemical stability over the relatively wide potential window of 0 to 5 V versus Li+/Li. ¹³C nuclear-magnetic-resonance measurements yielded results that suggested that in comparison with the other candidate salts, LiGa(OTf)₄ exhibits less ion pairing.

Planned further development will include optimization of the salt and solvent contents of such electrolyte solutions and incorporation of LiGa(OTf)₄ into gel and solid-state polymer electrolytes. Of the salts, LiGa(OTf)₄ is expected to be especially desirable for incorporation into lithium polymer electrolytes, wherein decreased ion pairing is advantageous and the large delocalized anions can exert a plasticizing effect.

This work was done by V. Prakash Reddy of the University of Missouri-Rolla; G.K. Syria Prakash, Jinbo Hu, and Ping Yan of the University of Southern California; and Marshall Smart, Ratnakumar Bugga, Keith Chin, and Subbarao Surampudi of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov.

NPO-41516