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# New Fast Ion Conducting Glasses: Towards Enabling High Energy Density and Safe All Solid State Batteries

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## Abstract

Li batteries are fire and explosion hazards. They also operate at 10 times less energy density than theoretically possible. The first of these problems is caused by the flammable liquid electrolyte used in their construction that can spontaneously ignite or explode if lithium ion batteries are charged incorrectly, stored in hot conditions, or discharged too rapidly. The second of these problems is caused by the fact that to give these batteries the little safety they do have, they must use graphitic carbon that reduces the amount of lithium that can be stored to 10% of the theoretical value. In spite of these two critical problems, lithium batteries remain about the only choice manufacturers have to store electrical energy for portable electronics and automobile propulsion. In our research ISU, we are working to solve these two critical problems and at the same time make lithium and sodium batteries that are cheaper and can be charged much faster. The core break through that has led to this possibility is the discovery of new solid electrolytes that conduct lithium and sodium ions through the battery more safely and faster than the flammable liquid electrolytes used to day. In this talk, I will describe our recent research that has led to the break through achievements of our research group in this area.

**Keywords:** glass, solid state battery, solid electrolyte, lithium sodium

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