

Li Superacid Salts Based Polymer Electrolytes For Li Battery Applications

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Use of lithium superacid salts is reported to enhance the room temperature conductivity and stability of polyether-based electrolytes. Lithium imide ($\text{LiN}(\text{CF}_3\text{SO}_2)_2$) and lithium triflate ($\text{CF}_3\text{SO}_3\text{Li}$) are the two salts that have been investigated extensively by several research groups. However, electrolytes prepared with these salts did not meet concurrently, both the requirements of higher conductivity and enhanced stability. JPL and USC are involved in an Air Force sponsored program to prepare and evaluate Li salts of higher superacids as candidate salts for Li-polymer electrolytes. Under this program four lithium superacid salts of general formula $\text{C}_n\text{F}_{2n+1}\text{SO}_3\text{Li}$, where n varies between 4 and 12, were synthesized and characterized. Polyethylene Oxide (PEO)-based electrolytes containing these new salts and state-of-art salts were prepared and evaluated for conductivity and stability over a wide temperature range. The conductivities of $\text{C}_4\text{F}_9\text{SO}_3\text{Li}$, and $\text{C}_8\text{F}_{17}\text{SO}_3\text{Li}$, are higher than that of $\text{CF}_3\text{SO}_3\text{Li}$. However, the conductivity of $\text{C}_{10}\text{F}_{21}\text{SO}_3\text{Li}$ is comparable to that of $\text{CF}_3\text{SO}_3\text{Li}$. Experimental Li - TiS_2 cells have been fabricated and cycling of the cells is in progress. Results of this study will be presented at the meeting.