

# Toyota details findings in electrolytes

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According to news reporting originating in Shizuoka, Japan, by VerticalNews journalists, research stated, "Sulfide solid electrolytes, which show high ion conductivity, are anticipated for use as electrolyte materials for all-solid-state batteries. One drawback of sulfide solid electrolytes is their low chemical stability in air."

The news reporters obtained a quote from the research from Toyota, "They are hydrolyzed by moisture and generate H<sub>2</sub>S gas. Substituting oxygen atoms for sulfur atoms in sulfide solid electrolytes is effective for suppression of H<sub>2</sub>S gas generation in air. Especially, the xLi<sub>2</sub>O center dot(75-x)Li<sub>2</sub>S center dot 25P(2)S(5) (mol%) glasses hardly generated H<sub>2</sub>S gas in air. However, substituting oxygen atoms for sulfur atoms caused a decrease in conductivity. The x = 7 glass showed high chemical stability in air and maintained high conductivity of 2.5 x 10<sup>-4</sup> S cm<sup>-1</sup> at room temperature. Performance of cells using the 7Li<sub>2</sub>O center dot 68Li<sub>2</sub>S center dot 25P(2)S(5) and the 75Li<sub>2</sub>S center dot 25P(2)S(5) glasses as solid electrolytes were compared. All-solid-state C/LiCoO<sub>2</sub> cell using the 7Li<sub>2</sub>O center dot 68Li<sub>2</sub>S center dot 25P(2)S(5) glass produced performance as good as that obtained using the 75Li<sub>2</sub>S center dot 25P(2)S(5) glass."

According to the news reporters, the research concluded: "Capacity retention and change of interfacial resistance of the former cell were superior to those of the latter cell after storage at 4.0 V and 60 A degrees C. The diffusion of oxygen element into the 7Li<sub>2</sub>O center dot 68Li<sub>2</sub>S center dot 25P(2)S(5) glass was less than that into the 75Li<sub>2</sub>S center dot 25P(2)S(5) glass after storage at the voltage of 4.0 V at 60 A degrees C. Improvement of the stability of sulfide solid electrolytes to moisture was related to cell performance as well as an increase in conductivity."

For more information on this research see: All-solid-state batteries with Li<sub>2</sub>O-Li<sub>2</sub>S-P<sub>2</sub>S<sub>5</sub> glass electrolytes synthesized by two-step mechanical milling. Journal of Solid State Electrochemistry, 2013;17(10):2551-2557. Our news correspondents report that additional information may be obtained by contacting T. Ohtomo, Toyota MotorCo Ltd, Battery Res Div, Higashifuji Technical Center, Shizuoka 4101193, Japan.

SOURCE : *Chemicals & Chemistry*