The Role of Liquid Electrolytes and Solid Membranes in New Battery Systems

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The classical function of an electrolyte in a battery is simply to separate two electrodes in a way that an internal shortcut is avoided. More precisely, the electrolyte enables ion transport between both electrodes but restricts electron transport over an external circuit. At first, it seems that the role of the electrolyte is very simple and therefore batteries are mostly discussed considering the electrode materials used. However, this is not the case. This presentation will discuss the special role of electrolytes for current Li-ion batteries and next generation systems. It will be shown that commercialization of post-lithium-ion battery systems such as metal-air or metal-sulfur batteries will crucially depend on whether or not smart electrolyte concepts can be developed that provide much more functions than just simply separating two electrodes.