



Special Feature: Energy Conversion and Storage

Overview

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This special issue describes various research studies on solar cells, fuel cells, and secondary batteries.

The first paper reviews the progress of $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) based photovoltaic solar cells. CZTS is a candidate absorber material for low-cost solar cells due to its semiconductor properties, such as its use of a direct band gap, and use of earth abundant and non-toxic elements.

On the other hand, there are electrochemical similarities between fuel cells and secondary batteries even though their methods of storing energy and conversion mechanisms are different. A common feature is that the energy-providing processes take place at the phase boundary of the electrode/electrolyte interface.

The second paper is a report on the development of the density functional theory combined with a modified version of the Poisson-Boltzmann theory (DFT-MPB). After describing its interfacial models and basic equations, DFT-MPB is applied to the interface of fuel cells.

In the following two papers, all-solid-state Li-ion and Li-air batteries, which are promising high energy storage devices, are described.