Development of all-solid-state battery

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Li-ion battery (LIB) has been widely used especially for mobile devices since its commercialization in 1991. Current LIBs are composed of intercalation-type electrodes and organic electrolytes (Fig. 1). The organic electrolytes are flammable and thereby current LIBs have intrinsic safety issue like fire hazard. In large scale application of LIB such as electric vehicles and grid energy storage, the safety issue becomes more severe.

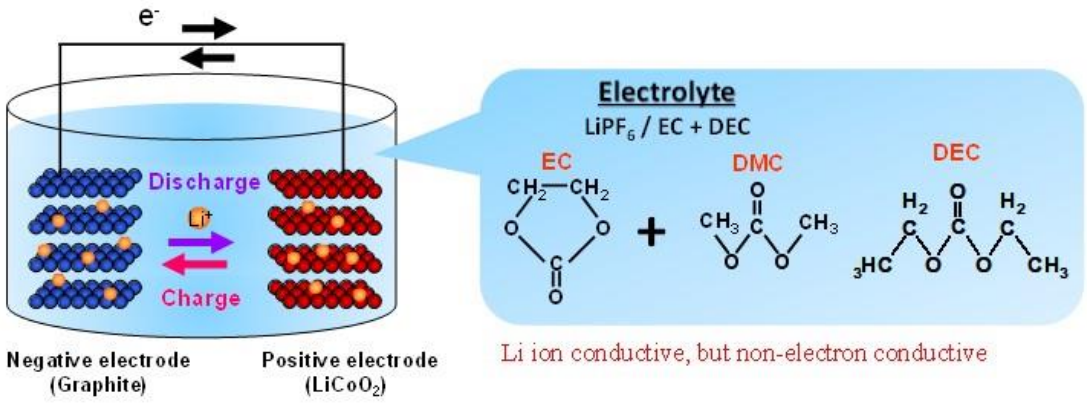

Fig. 1 structure of current Li-ion battery

All-solid-state battery using non-flammable solid electrolytes can eliminate flammable components in batteries and solve the intrinsic safety issue. Therefore, the all-solid-state battery has been recognized as a good option in next generation energy storage devices. In the development of all-solid-state battery, the non-flammable solid electrolytes are a key component because conventional electrode materials can be employed for the all-solid-state battery.

Ceramic solid electrolytes are categorized into oxides and sulfides (Fig. 2). We have researched oxide-based ceramic electrolytes. In the lecture, our recent research on oxide-based ceramic electrolytes are presented.

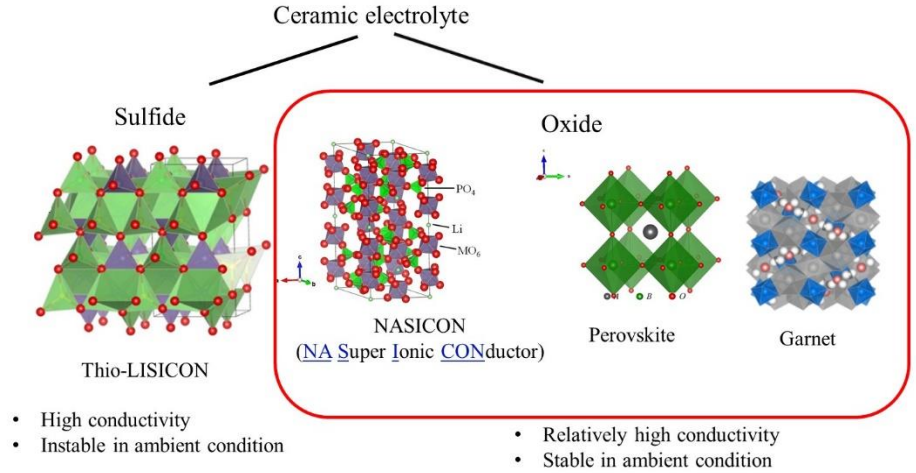

Fig. 2 Ceramic electrolytes