

Electrochemical application of ionic clathrate hydrate

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Ionic clathrate hydrates, which are composed of ionic guest and water-ion host framework, shows relatively high ionic conductivity and melting temperature compared to general gas hydrates. It was evident that their ionic conductivity was similar to those of Nafions and revealed that they can be used for solid electrolyte of electrochemical systems. We designed novel hydrogen electrochemical sensor and tested sensing property for hydrogen gas detection. The sensor assembly exhibited high sensing performance at the various H₂ concentrations in N₂ gas. In order to enhance sensing performance of the ICH-based sensor, CNT or graphene can be incorporated with ionic clathrate hydrate. In particular, it is predicted that an excellent electrical property of CNT profoundly affects the sensing property of the clathrate hydrate based hydrogen sensor. Not only hydrogen sensor but also other electrochemical systems will be studied to extend the application of ionic clathrate hydrate.