

## Ionic conductivity of tetraalkylammonium cation clathrate hydrates

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Solid electrolytes have become of particular importance due to their applicability to energy devices, sensors as well as various electrochemical systems. Recently, tetraalkylammonium cation hydrates have received some attention as potential proton conductors because they exhibit high ionic conductivity even at low temperature (below 0°C). The crystalline structure of hydrates largely depends on cationic or anionic species as well as temperature and hydration number, affecting their physicochemical properties. For example, Me<sub>4</sub>NOH clathrate hydrates have been reported to possess eight different crystalline phases according to its hydration number and temperature. The proton conduction through the water framework is strongly affected by anionic species, encaged guest molecules, and crystalline structure related to conduction path. In this study, we measured the ionic conductivity of various tetraalkylammonium cation hydrates and investigated the effect of crystalline structure and anion species on the conductivity.