

Physical Properties of Ionic Clathrate Hydrate Reinforced by Na MMT Clay

권민철, 차종호, 이 혼*

KAIST

(hlee@kaist.ac.kr*)

Ionic clathrate hydrates are known to create numerous crystalline structures by both the enclathration of hydrophobic cations or anions into confined cage spaces and the incorporation of hydrophilic counterions into water host framework. These types of hydrates can show some peculiar physical properties, such as high ionic conductivity and high thermal stability that cannot be found in non-ionic clathrate hydrates. Among the various ionic clathrate hydrates, Me_4NOH (tetramethylammonium hydroxide) pentahydrate has been particularly investigated for the application to proton conductor due to high melting point. However, inherent brittleness of clathrate hydrates still remains potential obstacle to real application. Accordingly, it could be essential to improve mechanical strength for deploying on a commercial scale. In this study, we intentionally mix and disperse Na MMT clay (1~4wt%) in $\text{Me}_4\text{NOH}\cdot 5\text{H}_2\text{O}$ matrix in order to the enhancement of mechanical strength, and characterize the physicochemical properties of compressive strength, melting point, ionic conductivity and electrochemical stability.