

Stable Entrapment of Superoxide Ions in Ionic Clathrate Hydrate

차민준, 신규철, 권민철, 고동연, 성보람, 이 혼*

KAIST

(h_lee@kaist.ac.kr*)

Unlike non-ionic clathrates hydrate stably formed by van der Waals interaction between a guest molecule and a surrounding host framework, ionic clathrate hydrates are stabilized by ionic interaction between an ionic guest molecules and the host water-framework. Owing to notable physicochemical characteristics of ionic clathrate hydrates such as ionic conductivity enhancement, melting point increase much above room temperature, abnormal magnetic transition behavior and vacant cage generation by forming specific structures, ionic clathrate hydrates as a potential applications such as hydrate-based functional materials are promising, but their complex nature still remains to be adequately answered through both microscopic and macroscopic approaches. In the present work, we firstly described the stable entrapment of the superoxide ions in γ -irradiated $\text{Me}_4\text{NOH} + \text{O}_2$ hydrate. Owing to peculiar direct guest-guest ionic interaction, the lattice structure of γ -irradiated $\text{Me}_4\text{NOH} + \text{O}_2$ hydrate shows significant change of lattice contraction behavior even at relatively high temperature (120 K). Such findings are expected to provide useful information for a better understanding of unrevealed nature of clathrate hydrate fields.