

Neutron and Synchrotron Diffraction Study of Ionic Clathrate Hydrates including non-ionic gaseous guest molecules

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In this work, we measured the thermal expansivities of binary sII $\text{Me}_4\text{NOD}\cdot 16\text{D}_2\text{O}$ and sI $\text{DCIO}_4\cdot 5.5\text{D}_2\text{O}$ with non-ionic gaseous molecules through neutron powder diffraction (HANARO, KAERI) and synchrotron diffraction (Pohang Accelerate Laboratory, POSTECH). The existence of ionic species in ionic clathrate hydrates creates a unique host-guest interaction compared to that of non-ionic clathrate hydrates. It was revealed that synchrotron diffraction cannot be used for research of ionic clathrate hydrates due to beam damage. General relations for the thermal behaviors of given structures (structure I and II) were investigated and lattice expansions/thermal expansivities depending on the guests were compared between ionic and non-ionic clathrate hydrates.