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Fabrication of Hard-Shell Microcapsules Containing Inorganic Materials

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Highlights

- Hard-shell microcapsules containing $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ were fabricated.
- Microcapsules depressed the supercooling of the inorganic hydrates
- Effects of the parameters in the process of fabrication on the microcapsule size were investigated.
- The surfactants reduction in the process realized high void fraction of hollow microcapsules.

Abstract

The fabrication method of silica hard shell microcapsules containing disodium hydrogen phosphate dodecahydrate ($\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$) has been developed. The effects of the mixing rates for the emulsification, of the volume ratios of solutions and of surfactant concentrations on the size of hollow microcapsules have been also studied. From the results, it was confirmed that silica hard shell microcapsules can contain $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ with the present method using hollow microcapsules. The present micro-encapsulated $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ was also found to cause the supercooling depression effect. As the fabricated microcapsules have no flammability, the present microcapsule was concluded to be a promising item not only for latent heat transportation media but also for the static thermal storage materials for architectural structures. From the studies on the fabrication parameters, it was concluded that the control of the surfactant concentration is effective for controlling the size of microcapsule.

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