

Development of Multiple Metal-Carbonate Hollow Particles Using a Selective Extraction Method of Bittern Component

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Summary

The goal of this study is to prepare hollow particles of dolomite ($\text{CaMg}(\text{CO}_3)_2$) by selectively extracting Ca^{2+} and Mg^{2+} in bittern using the W/O/W emulsion method. When carbonate particles were prepared by the reaction of Ca^{2+} and Mg^{2+} in the external aqueous phase with CO_3^{2-} in the internal aqueous phase, it was possible to prepare spherical particles by the reaction at the oil-water interface. However, there were few particles with hollow structure and Ca^{2+} was preferentially introduced. Therefore, as a preliminary step to the preparation of dolomite particles, the preparation of magnesium carbonate (MgCO_3) hollow particles in a single metal reaction system of Mg^{2+} was attempted. As a result, it was difficult to prepare hollow structures efficiently in the reaction using W/O/W emulsions. It was predicted that the interfacial reaction would not be uniformly controlled in W/O/W emulsions because the metal would not be equally transported to each internal aqueous phase. To improve this problem, an interfacial reaction was performed by mixing a W/O emulsion with an oil phase containing metal ions beforehand. Then, it was found that this method facilitated the formation of hollow spherical particles. Currently, I am investigating uniform hollow particle preparation by performing emulsion formation and interfacial reactions using microfluidics.