

CO₂ drying process for fabrication of surface modified CeO₂ nanoparticles with perfect re-dispersibility

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The dispersibility which makes NPs monodisperse is important to enhance performance of materials. However, re-dispersion of NPs is considered as a much more important property because NPs have to be dispersed again into a solvent for the various uses. To achieve perfect re-dispersion of surface modified CeO₂ NPs (SM-CeO₂ NPs), it is suggested that produced NPs stored as a dried form with relatively low possibility of aggregation. New drying method introduces supercritical CO₂ to remove a capillary force which is arose in conventional drying methods such as hot-air or spray drying. At same time, CO₂ drying is a very effective process to wash the free surface modifier, which is not bound to surface of CeO₂ NPs. As a result, dried SM-CeO₂ NPs without aggregation are successfully obtained by simple procedure reducing wastewater. In addition, the CO₂ drying method is thought to be as a energy conserving process relatively comparing to a freeze drying process since the process is operated at very mild conditions. Therefore, CO₂ drying is expected as a promising technique to produce dried SM-NPs with perfect re-dispersibility for the various applications.