

## **Novel Recovery of Nano-Structured Ceria (CeO(2)) from Ce(III)-Benzoxazine Dimer Complexes via Thermal Decomposition**

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**Abstract:** N,N-bis(2-hydroxybenzyl)alkylamines, benzoxazine dimers, are the major product produced from benzoxazine monomers on mono-functional phenol by the one step ring opening reaction. Due to the metal responsive property of benzoxazine dimers, in this present work, N,N-bis(5-methyl-2-hydroxybenzyl)methylamine (MMD), N,N-bis(5-ethyl-2-hydroxybenzyl)methylamine (EMD), and N,N-bis(5-methoxy-2-hydroxybenzyl)methyl amine (MeMD), are considered as novel ligands for rare earth metal ion, such as cerium(III) ion. The complex formed when the clear and colorless solutions of cerium nitrate and benzoxazine dimers were mixed, results in a brown colored solution. The metal-ligand ratios determined by the molar ratio and the Job's methods were found to be in a ratio of 1:6. To clarify the evidence of the complex formation mechanism, the interactions among protons in benzoxazine dimers both prior to and after the formation of complexes were determined by means of (1)H-NMR, 2D-NMR and a computational simulation. The single phase ceria (CeO(2)) was successfully prepared by thermal decomposition of the Ce(III)-benzoxazine dimer complexes at 600 degrees C for 2 h, was then characterized using XRD. In addition, the ceria powder investigated by TEM is spherical with an average diameter of 20 nm.

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