

Powder Characterisation of MgO, SiO₂, TiO₂ Doped Al₂O₃ Prepared by Chemical Methods for Nuclear Fusion Applications

Maria Teresa Colomer, Juan Carlos Farias, Jos Ramn Jurado

CSIC - SPAIN

Abstract

Nuclear fusion is considering an unlimited electric generation system, at present some difficulties avoided their convenient domestic use, one of the problem is the high performance of material requirement, particularly in the microwave environment. Alumina is one of compound vastly employed in that applications, however alumina has several limitations in the range of frequency above mentioned, the co-doping with suitable oxide systems can be considered an alternative to maintain the material performance at so high frequency. To obtain appropriated level of doping (300, 1000, 3000 and 10.000 ppm dopant concentration level), chemical routes like combustion synthesis and nitrate thermal decomposition were used in this work. Powders achieved with these techniques shows amorphous XRD pattern with high specific surface area (250 m²/g) and a bimodal particle morphology feature, SEM and HTEM observation indicated the small nanocrystalline structure of as-prepared powders and their irregular shape. As-prepared powders were subsequently calcined and milling and changes observed in their morphology and their suitability for packing behaviour is detailed discussed.