

Transparent Y₂O₃ ceramic doped with Yb as a laser material

Bruno Le Garrec, Agnes Dupont

CEA-CESTA - FRANCE

Abstract

This presentation deals with the influence of the whole chemical process from an yttria precursor to lead to an optical transparent Y₂O₃ ceramic. A sol-gel method has been adopted to synthesize the oxide precursor and different parameters such as the nature and the concentration of the chelating agent have been first tried. Precursors have been characterized using different techniques such as SEM, XRD, TEM, XPS, EDS, IR and Raman spectroscopy. Yttria powder is obtained through a calcination step. Then the sintering process revealed the huge influence of each parameter such sintering time or temperature, sintering atmosphere, and that, related to each different synthesis. This study proves that natural sintering remains a difficult way to obtain dense and transparent ceramics (transmittance;98%). That is why this presentation exhibits a final step to obtain transparent ceramics, which appears as a good material easier to obtain than crystals exhibiting very high melting points. Y₂O₃ ceramic with excellent optical transparency in the visible range has been recently obtained. The presentation will show results obtained with Y₂O₃ ceramic and Ytterbium doped Y₂O₃ ceramic.