**Processing and Properties of Sintered Submicron IR Transparent Yttria Ceramics Derived Through Sol-Gel Method**

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**ABSTRACT**

IR transparent sintered submicron yttria has been fabricated using sol-gel processing. Yttrium nitrate hexa-hydrate was used as a major precursor for the synthesis of transparent yttria sol. Yttrium oxide seeds and sintering additives were introduced to the sol followed by gelation, drying and calcination to obtain yttria powder. The powder was further shaped through uniaxial compaction followed by densification at temperatures between 1200 – 1400°C in air atmosphere. The samples which attained zero percent closed porosity were further pressed hot isostatically (HIP) to obtain 100% dense yttria samples.

The powder synthesized through the above process was characterized for its physical, microstructural, and chemical properties. The sintered and HIPed samples were also characterized for their physical, mechanical and optical properties. The samples produced in this method exhibited the grain size around 500 nm on an average and showed about 70% IR transmission in the 3 – 7 µm wavelength region.