

Fabrication and Optical Studies of Transparent Tm, Ho:YAG Ceramics

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The aim of the work was to obtain transparent Tm,Ho:YAG ceramics (thulium doping range: 2-6 at.%, holmium doping range: 0.1-1.0 at.%) by reaction sintering using commercial powders. Two types of granules were used: "manual" (obtained by sieving ceramic mas through a sieve) and granules obtained by the freeze granulation. The granulates were pressed (120 MPa) into pellets and the obtained samples were sintered in a vacuum at 1830°C for 6 h. It has been proved that the crucial role for the optical quality for ceramics plays particle size, purity and degree of agglomeration of the powders used. Freeze granulation method allowed to obtain Tm,Ho:YAG ceramics with a high degree of microstructure homogeneity, which resulted in a high transmission values. The spectroscopic results (emission spectra and fluorescence decay) for Tm,Ho:YAG ceramics with different concentration of active ions were presented and discussed. As found, both concentration of holmium and thulium separately as well as the balance between them are of great importance. Energy transfer between Tm and Ho ions was proved.

Keywords: Tm,Ho:YAG, transparent ceramic, freeze granulation, yttrium aluminum garnet, energy transfer

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