

Improvements in the processing of Yb:YAG ceramic materials

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Laser ceramics can attain a significant role in the frame of the generation of high peak power, high energy laser pulses at high repetition rate, applications where fiber lasers or single crystals undergo fundamental or technological limitations [1].

A ceramic material in order to be used as a laser amplifier, needs to fulfil strict requirements in terms of properties, in particular microstructure, purity level, porosity. The important role played by the production process on the transparency of ceramic materials has been explained elsewhere [2,3].

The current study focuses on the optimization of the powder processing. An innovative Spray Drying process of solvent-based suspensions has been adopted for the preparation of ready-to-press powders for the reactive sintering of Yb:YAG materials. The influence of the experimental conditions on the morphology of the granulated powders and eventually on the microstructure evolution during sintering and the transparency, is described.

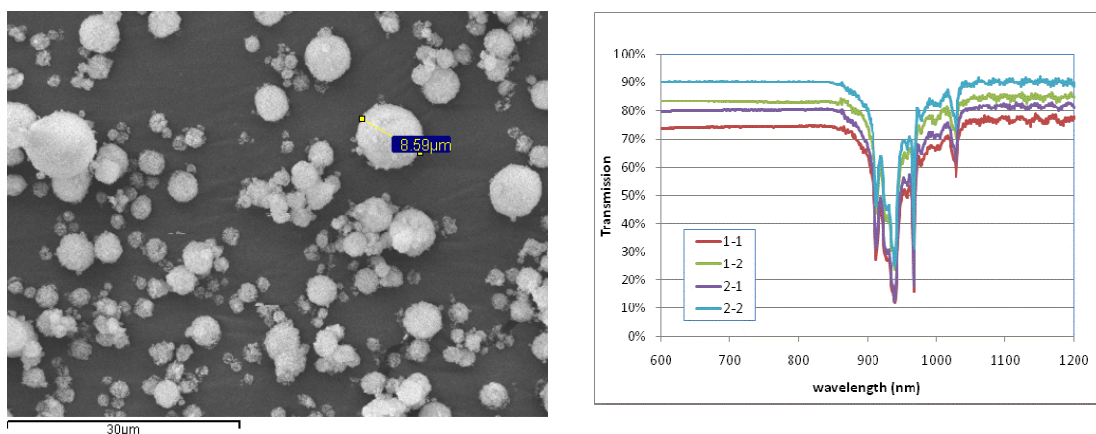


Figure 1. Example of spray dried powder (left) and VIS-IR Transmission spectra of few investigated samples (right). The spectra are corrected for Fresnel reflections up to the second order

References

- [1]. J.W. Dawson, M.J. Messerly, R.J. Beach, M.Y. Shverdin, E.A. Stappaerts, A.K. Sridharan, P.H. Pax, J.E. Heebner, C.W. Siders and C.P.J. Barty. *Opt. Expr.* 16 (2008), p. 13240
- [2]. L. Esposito, A. Piancastelli, "Role of powder properties and shaping techniques on the formation of pore-free YAG materials" *Journal of the European Ceramic Society*, **29** 7 317-322 (2009)
- [3]. D. Alderighi, A. Pirri, G. Toci., M. Vannini, L. Esposito, A L. Costa, A. Piancastelli, M. Serantoni, "Characterization of Yb:YAG ceramics as laser media" accepted for publication in *Optical Materials*.