
Invited presentation:

Advanced shaping approaches for the production of transparent ceramics and ceramic laser gain media

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Abstract:

Transparent ceramics have been in the spotlight as advanced optical ceramic materials for the last two decades, in particular with rare earth doping for applications in photonics, and even more so with the wider use of compact diode-pumped lasers. The advantage of ceramic technology over that of single crystals is strongly related to the shaping possibilities given by the wide range of processing techniques. In the case of uniformly doped laser rods, even to-date, single crystals remain the material of choice, but their technology lacks the flexibility in terms of shapes and even more in compositional variation. Different studies have shown the advantages of dopant gradients or the introduction of multiple dopants into one component. And where single crystals require expensive, and not always reliable bonding processes, ceramics can be produced in one piece by different methods. The present work illustrates the various approaches applied in the shaping of transparent ceramics with structured dopant distribution for lasers. In particular, planar and channel laser waveguides composed of doped and dopant-free parts (Yb:YAG - YAG) were produced without the requirement of complex post-processing after a vacuum sintering step. The optical and laser performance is shown.

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