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Autore	Ikesue Akio <1958->
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Requirements for sesquioxide ceramic lasers -- 4.3. Synthesis of optical grade sesquioxide ceramics -- 4.4. Optical quality and laser performance -- References -- 5.1. Production of heavily doped Nd:YAG and lasing characteristics -- 5.2. Effect of impurity (Si) on Nd solid-melt in YAG ceramics -- References -- 6.1. Introduction -- 6.2. Experimental procedure -- 6.3. Results -- 6.4. Discussion -- 6.5. Summary -- References -- 7.1.Composite technology -- 7.2. Ceramic fiber laser -- 7.3. Single crystal ceramics produced by sintering -- 7.4. Summary -- References -- 8.1. Garnet system materials -- 8.2. Perovskite system materials -- 8.3. Non-oxide system (II-VI compound) materials -- 8.4. Fluoride system materials -- 8.5. Applications in the fields of biotechnology and medical technology -- 8.6. High intensity lasers for engine ignition -- 8.7. Investigation of solid-state lasers as solar pump lasers -- References -- References -- 10.1. Structural characterization of doped ceramics by optical spectroscopy -- 10.2. The quantum states of the doping ions -- 10.3. Radiative and non-radiative de-excitation processes -- 10.4. Distribution of the doping ions in ceramics -- 10.5. Conversion of excitation in doped ceramics -- 10.6. Conclusions from high resolution optical spectroscopy of laser ceramics -- References -- 11.1. Pumping schemes -- 11.2. Radiative and non-radiative processes in ceramics -- 11.3. Ceramic laser materials and components -- 11.4. Ceramic lasers -- 11.5. Concluding remarks: the state of the art and directions of development of ceramic lasers -- References.

Sommario/riassunto

Until recently, ceramic materials were considered unsuitable for optics due to the numerous scattering sources, such as grain boundaries and residual pores. However, in the 1990s the technology to generate a coherent beam from ceramic materials was developed, and a highly efficient laser oscillation was realized. In the future, the technology derived from the development of the ceramic laser could be used to develop new functional passive and active optics. Co-authored by one of the pioneers of this field, the book describes the fabrication technology and theoretical characterization of ceramic material properties. It describes novel types of solid lasers and other optics using ceramic materials to demonstrate the application of ceramic gain media in the generation of coherent beams and light amplification. This is an invaluable guide for physicists, materials scientists and engineers working on laser ceramics.