

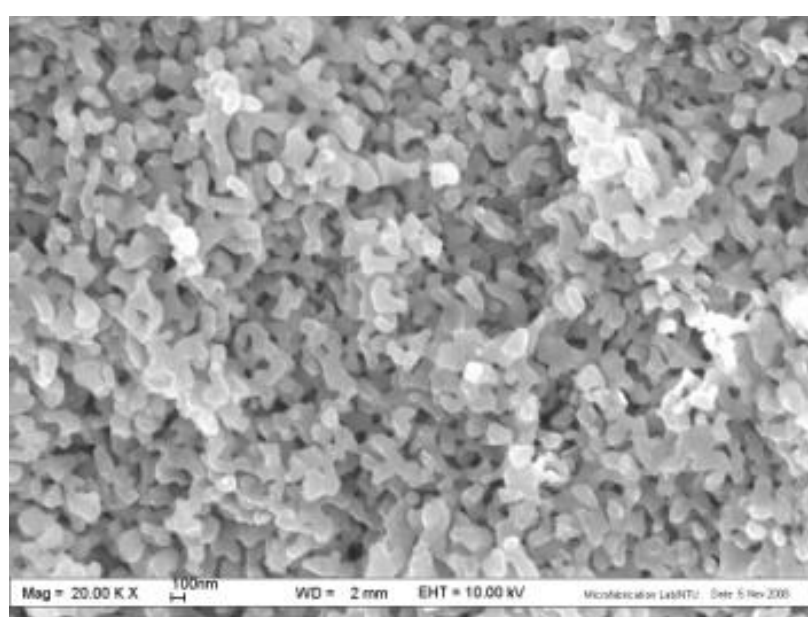
Development of nano-crystalline ceramic laser materials and high power diode pumped ceramic lasers

Project Motivation/Objectives:

Recent development of the nanomaterial processing technology and high temperature vacuum sintering made available of producing optical transparent ceramics, which can be used as solid-state laser gain host for high power lasers or in the military armors. The objectives of the project are to develop the processing techniques for fabricating various rare-earth ions doped ceramic laser materials and to use the ceramic laser materials to develop high power diode pumped ceramic lasers.

Technical achievements/ findings:

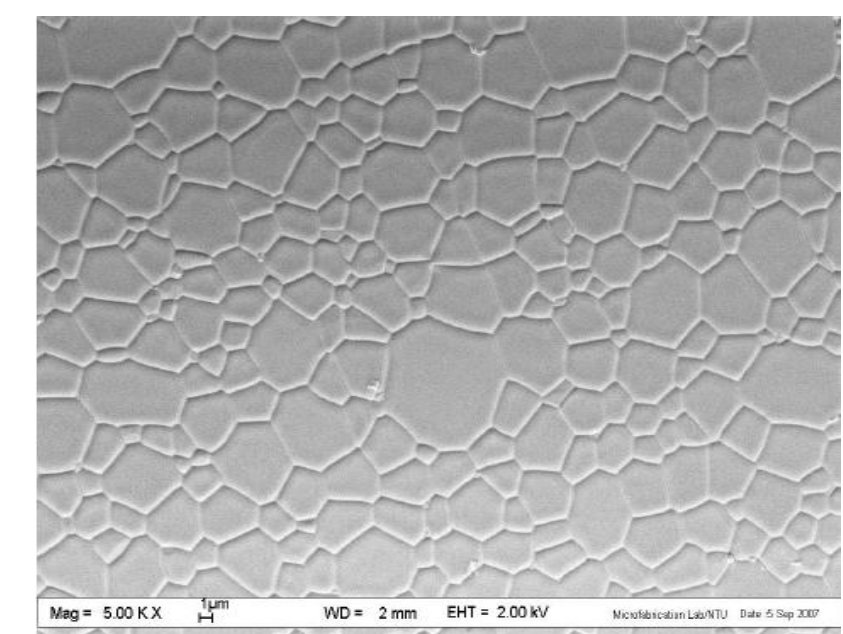
- Fabrication process for nanopowders and optical transparent ceramics have been developed.
- High quality Nd (Yb, Er, Tm, Ho):YAG, Yb:LuAG, Yb (Nd, Er, Ho):Y₂O₃ laser ceramics have been successfully fabricated.
- High efficient high power laser emission of the diode pumped Nd: (Yb, Er, Tm, Ho):YAG ceramic lasers have been successfully demonstrated.



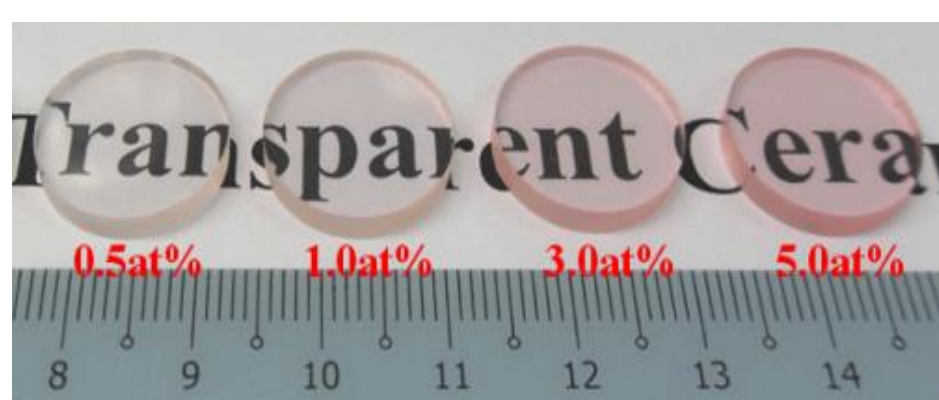
The FE-SEM picture of prepared Nd:YAG powders



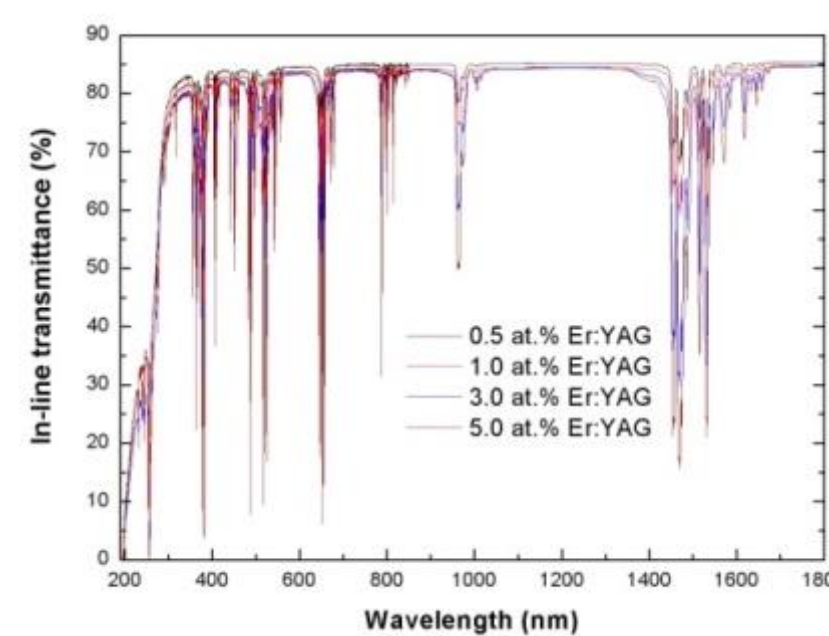
The photos of transparent ceramics (from left to right: YAG, Nd:YAG, Y₂O₃, Nd:Y₂O₃)



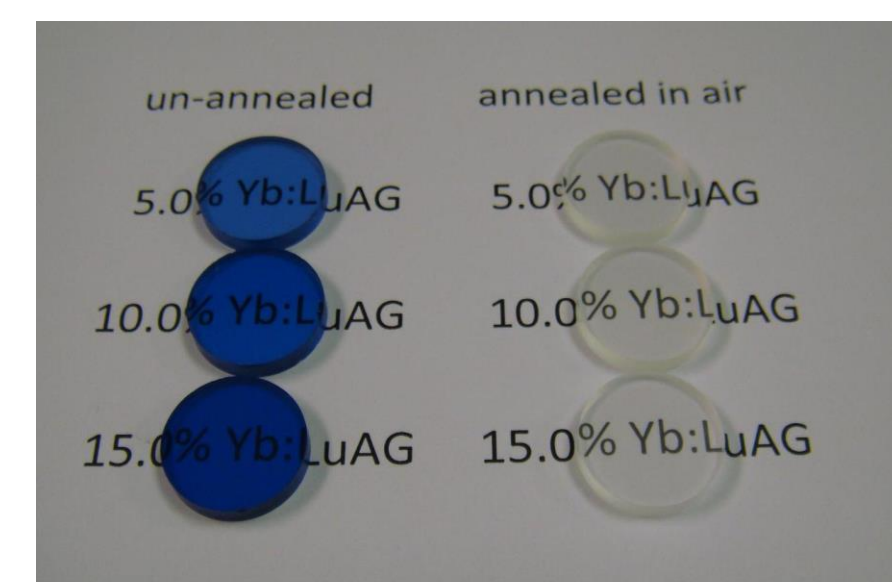
The microstructure of transparent Nd:YAG ceramics



The Er-doped YAG laser ceramics with different doping concentrations.



The in-line transmittance of the Er-doped laser ceramics with different doping concentrations.



The Yb-doped LuAG laser ceramics with different Yb-doping concentrations

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