
The effect of thermal annealing on structure relaxation and optical properties of Yb³⁺ doped Al₂O₃-P₂O₅-SiO₂ glass

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Abstract

Abstract: The ytterbium doped silica fiber is widely used in high power laser facility. However, few reports had been done on the structure relaxation behaviors with temperature in the ytterbium doped silica glass. In this work, we prepared the Yb³⁺ doped Al₂O₃-P₂O₅-SiO₂ bulk glass with sol-gel method combining with high temperature sintering. The annealing was done at different temperature on the glass. The density, fictive temperature, refractive index and spectroscopic properties of the annealed Yb³⁺ doped Al₂O₃-P₂O₅-SiO₂ glasses have been characterized. The structures of these glasses were tested by NMR and EPR. The physical and optical property change mechanism is explained by local structure change of Yb³⁺ and coordination number change of Al³⁺ and P⁵⁺ ions in the Yb³⁺ doped Al₂O₃-P₂O₅-SiO₂ glass.

Keywords: structure relaxation, optical properties, ytterbium doped silica glass

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