

졸-겔 방법으로 제조된 Er doped $\text{Al}_2\text{O}_3/\text{SiO}_2$ 필름의 다공성과 결정성에 대한 광 발광 특성

The dependence of porosity and crystallinity on photoluminescence properties of Er doped $\text{Al}_2\text{O}_3/\text{SiO}_2$ films prepared by sol-gel method

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Optical amplifiers have been used to compensate the losses in the optical signal transmission and processing. Today, there has been increasing demand for the very low cost optical amplifier. Sol-gel offers considerable potential both low cost manufacture, and for great flexibility in materials composition and structure. In addition, the sol-gel process is a very attractive method for producing porous materials with controlled structure. In this work, we present the photoluminescence properties of Er doped $\text{Al}_2\text{O}_3/\text{SiO}_2$ films. Erbium doped alumina nano sol was prepared by $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ and $\text{Er}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$ through hydrolysis and peptization, and then GPS (3-Glycidoxypropyltrimethoxysilane) was added into Er doped alumina nano sol for organic-inorganic hybridization. Er doped $\text{Al}_2\text{O}_3/\text{SiO}_2$ film was obtained by spin coating, dip coating and thermal treatment from $300^\circ\text{C} \sim 1200^\circ\text{C}$, and there were crack-free after thermal treatment. The thickness of film was measured SEM, and the porosity of film was characterized by BET and TGA. The crystal phase of Er doped $\text{Al}_2\text{O}_3/\text{SiO}_2$ were determined by XRD. Finally, the photoluminescence properties of Er doped $\text{Al}_2\text{O}_3/\text{SiO}_2$ films will be discussed with the consideration of porosity and crystallinity.