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研究论文

共掺Na+(K+)/Er3+50SiO2--30PbO-20PbF2--0.8ErF3玻璃陶瓷的上转换光谱性质

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摘要: 研究掺入少量的碱金属离子Na+、K+后, 50SiO2--30PbO--20PbF2--0.8ErF3玻璃及玻璃陶瓷的热稳定性质和光谱性质。应用Judd--Ofelt理论和吸收光谱计算了Er3+离子的J--O参数Ωλ(λ=2、4、6)。上转换光谱分析表明: 在520、545和650 nm处有较强的绿光和红光发射, 在412 nm处有微弱的紫光发射, 分别对应2H11/2→4I15/2, 4S3/2→4I15/2, 4F9/2→4I15/2, 2H9/2→4I15/2的跃迁。碱金属离子K+、Na+的加入均有利于掺Er3+硅酸盐玻璃和玻璃陶瓷的上转换发光增强, 添加Na+的样品尤其明显。XRD、吸收光谱以及上转换荧光光谱结果表明, 掺入Na+离子后, 在50SiO2--30PbO--20PbF2--0.8ErF3--0.5NaF中有部分Er3+:β--PbF2微晶。

关键词: 无机非金属材料 共掺杂 稀土掺杂玻璃陶瓷 上转换 碱金属离子

Upconversion Spectroscopic Properties of Na+ (K+)/Er Codoped 50SiO2－30PbO－20PbF2－0.80ErF3 Glasses and Glass Ceramics

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Abstract: The upconversion spectroscopic properties of Na+(K+)/Er codoped 50SiO2－30PbO－20PbF2－0.80ErF3 glasses and glass ceramics were studied. Three major glasses were prepared by sintering method according to the following molar composition: 50SiO2－30PbO－20PbF2－0.8ErF3 (EG), 50SiO2－30PbO－20PbF2－0.5KO1/2－0.8ErF3 (KG), 50SiO2－30PbO－20PbF2－0.5NaF－0.8ErF3 (NaG). Er3+: β−PbF2 nano－crystallites grew in whole glasses, after heating treatment at the temperature 30oC higher than Tg. However, there existed small amount of Er3+ : β−PbF2 nano－crystallite in the NaG even before heating treatment. J－O parameters, Ω2, Ω4, Ω6, were calculated from absorption spectrum according to J－O theory. The glass ceramics emitted more intensive red, green and blue upconersion luminescence than that of the glasses under exitation of 980 nm laser diode.

Keywords: inorganic non-metallic materials codoped rare earth ion doped glass ceramics upconversion alkali metals ion

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