



材料合成及性能

不同醇水比对 β -NaYF₄: Yb³⁺, Er³⁺晶相的影响

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摘要：采用水热法制备不同醇水比的NaYF₄: 20%Yb³⁺, 2%Er³⁺晶体, 通过XRD、FE-SEM、TEM、PL测试手段对合成样品进行表征和分析。样品的FE-SEM图结果表明, 随着醇水比的增大, 颗粒尺寸越来越小, 最小可达纳米级。通过XRD测试表明, 醇水比对样品的晶相亦有影响, 当醇水比为30/10 mL时, 产物中开始出现 α -NaYF₄晶相。验证了形成机理的正确性并得到一条相转变反应时间与醇水比关系的模拟曲线图。TEM图显示样品属于多晶, 且结晶性能良好。在980 nm近红外光激发下, β -NaYF₄: 20%Yb³⁺, 2%Er³⁺上转换晶体发出绿光和红光。

关键词：醇水比 α β -NaYF₄ 颗粒尺寸 上转换发光

Effects of Different Volume Ratio of Diglycol to Water on The Crystalline Phase of β -NaYF₄: Yb³⁺, Er³⁺

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Abstract: NaYF₄: 20%Yb³⁺, 2%Er³⁺ crystal has been prepared via a simple hydrothermal route at different volume ratio of diglycol to water. X-ray diffraction (XRD), field emission-scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM), and photoluminescence (PL) spectra were used to characterize and analysis the samples. FE-SEM images show that the samples have a smaller size with the increase of volume ratio of diglycol to water and finally can reach nanoscale. XRD results have proven that the volume ratios of diglycol to water have an effect on crystalline phase, and α -NaYF₄ phase begins to appear in the products when volume ratio of diglycol to water reaches to 30/10 mL. The forming mechanism is proved to be correct and get a simulation diagram of the relationship between phase transition time and volume ratio of diglycol to water. TEM images indicate that the samples belong to the polycrystalline and have good crystallinity. Under the excitation of 980 nm semiconductor laser, β -NaYF₄ crystal can emit bright blue/red upconversion luminescence.

Keywords: volume ratio of diglycol to water α , β -NaYF₄ particle size up-conversion luminescence

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