



A Polyol-Mediated Fluoride Ions Slow-Releasing Strategy for the Phase-Controlled Synthesis of Photofunctional Mesocrystals

Xianghong He*, Yaheng Zhang, Yu Fu, Ning Lian, and Zhongchun Li

School of Chemistry and Environmental Engineering, Jiangsu University of Technology, Changzhou, Jiangsu 213001, China

* Correspondence: hexh@jsut.edu.cn; Tel.: +86-519-8695-3269

The reason why BminPF_6 rather than either 1-butyl-3-methylimidazolium tetrafluoroborate (BmimBF_4) or NH_4F was chosen as the fluorine source is as follows. Cui et al. found that a mixture of cubic and hexagonal phase NaYF_4 were obtained in a BmimBF_4 -based system [1]. $\alpha\text{-NaYF}_4$ based nano-/microcrystals with an irregular shape instead of mesocrystals were obtained via a solvothermal method using polyol such as glycol, diethylene glycol, or ethylene glycol (EG) as medium, as well as NH_4F or NaF as the fluorine source [2, 3]. Qu et al. reported that the sample prepared at low temperature (down to 80°C) via an EG-mediated solvothermal route using NH_4F as the fluoride source in the presence of trisodium citrate was made up of hexagonal NaYF_4 microspheres [4]. In this work, we failed to obtain NaYF_4 using BmimBF_4 as the fluoride source. As exhibited in Figure S1, the sample synthesized with BmimBF_4 was YF_3 nanocrystals with an orthorhombic phase structure (PDF No. 70-1935). Similar case was also found by Cui et al. [5] and Xu et al. [6]. Hence, we chose BminPF_6 rather than either BmimBF_4 or NH_4F as the fluorine source.

References

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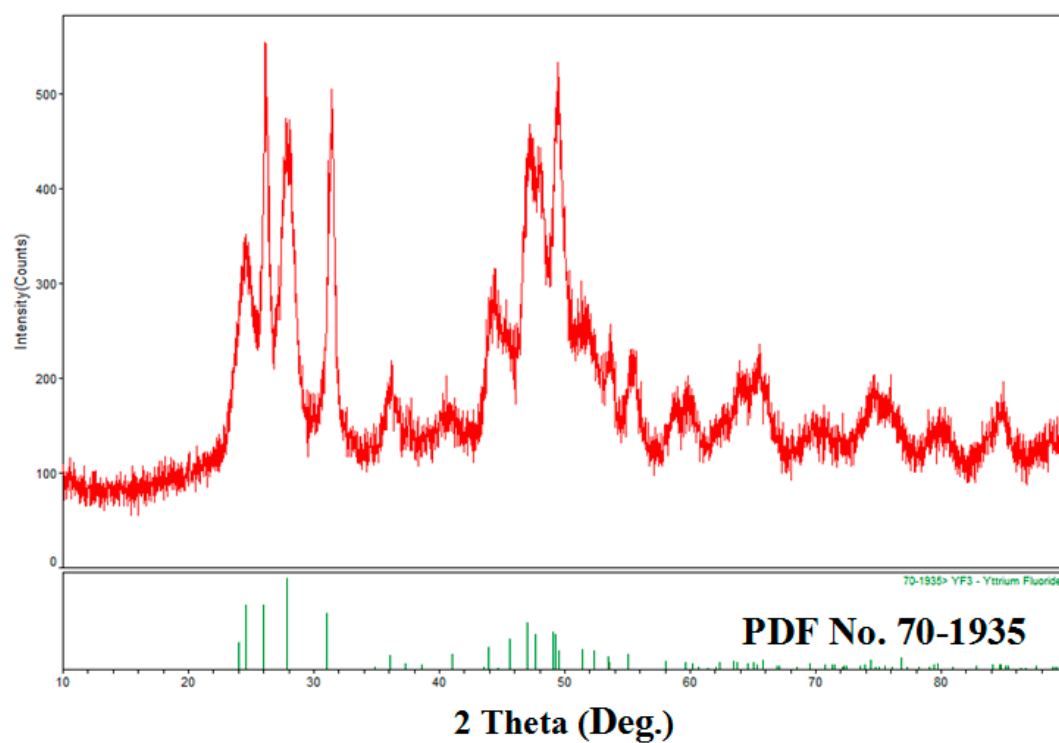
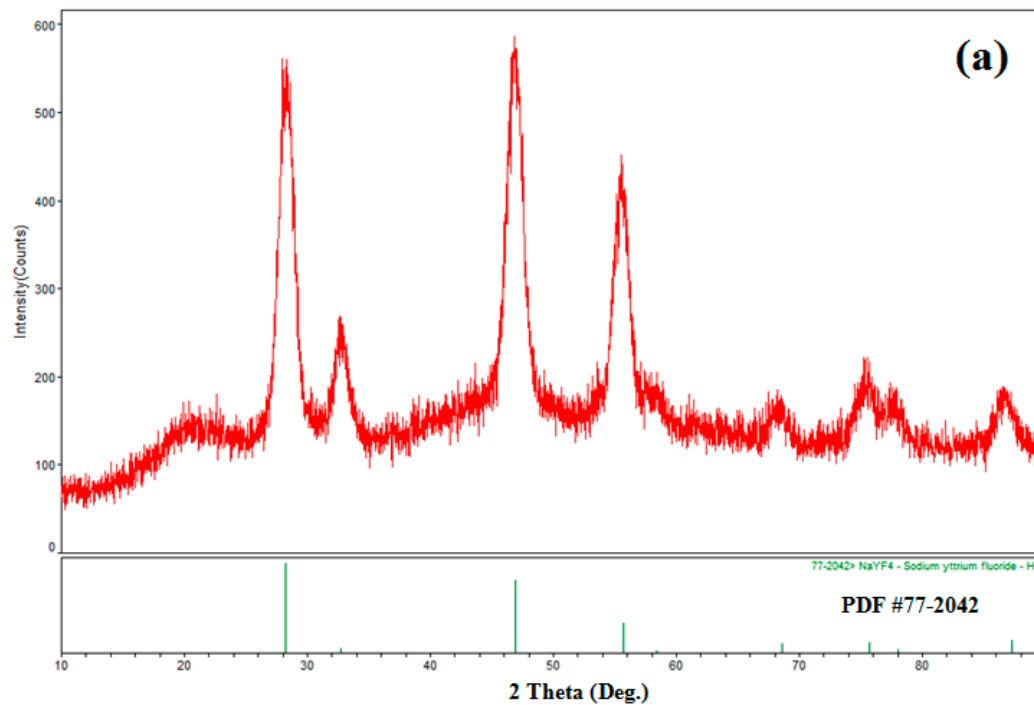


Figure S1. XRD pattern of the sample using BmimBF₄ as fluorine source (The bar represents the standard cards PDF#70-1935 for YF₃).



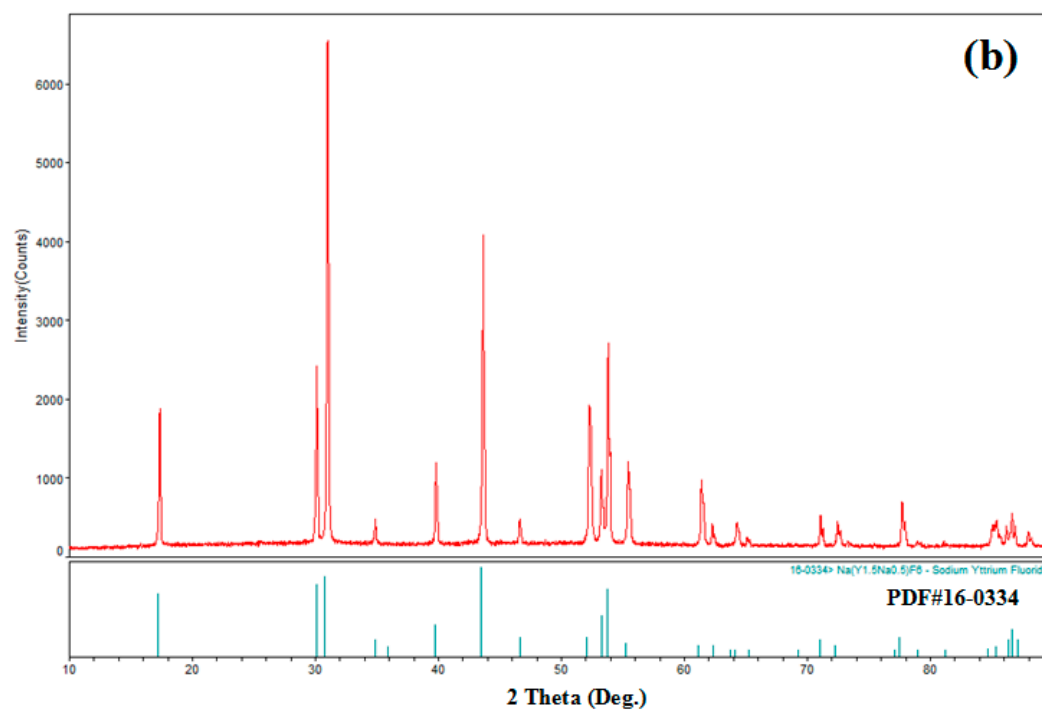


Figure S2. XRD patterns of NYF:Yb³⁺,Er³⁺ (20/2 mol%) NCs via a LSS method at (a) 120 °C and (b) 220 °C (The bars in (a) and (b) represent the standard cards PDF#77-2042 and #PDF16-0334, respectively).