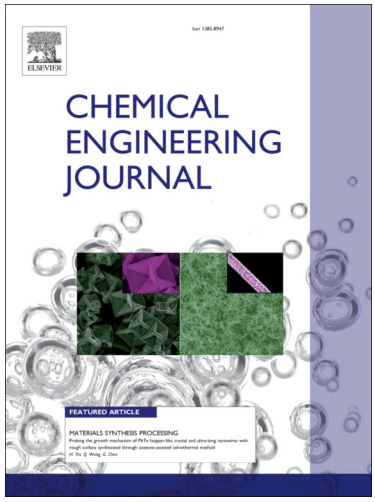

Lead-based crystal luminophores: tuning emissive crystals and application for recording high temperature history with ratiometric and colorimetric signals

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Lead-based crystal luminophores: tuning emissive crystals and application for recording high temperature history with ratiometric and colorimetric signals

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Abstract

The development of luminescent crystal sensors for monitoring temperature changes and recording thermal history is still an interesting challenge because their wide applications in several industrial fields and their good thermal stability in harsh environments. Herein, we report a luminescent crystal sensor based on Lead-based complex for recording the high temperature history ($> 230\,^{\circ}C$). Seven kinds of Lead-based complexes are designed and synthesized under an optimizing strategy for obtaining the crystal luminophores with high emissive brightness. Among them, complexes **1** ($Pb(2,2'-bipy)I_2$), **5** ($Pb(1,10-phen)I_2$) and **6** ($Pb(1,10-phen)_2I_2$) show bright luminescence with the maximum emission at 595 nm, 565 nm and 592 nm, all of which use I^- as the halide ligand. Thermogravimetric analysis results indicate that **5** and **6** show high degraded temperature at 230 and 330 °C, respectively. Combing with their different emissive colors, the transition process from **6** to **5** can be used to construct a high temperature recorder with the ratiometric response. Further experiments evidence that complex **6** can stably transits into **5** even at 270 °C through the partial degradation of the organic ligand. Notably, the emissive colors vary from orange (CIE coordination: 0.515, 0.472) to yellow (CIE coordina-

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