Supplementary Information

Molten salt synthesis, growth mechanism, and

photoluminescence of rod chlorapatite microcrystallites

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Fig. S1 Emission spectra of (a) ClAP: Eu²⁺ (ex=370 nm), (b) ClAP: Tb³⁺ (ex=210 nm)
(c) ClAP: Sb³⁺ (ex=202 nm) at different test temperatures (25-200 °C) and (d) the relative emission intensity at different temperatures of the three phosphors.

The thermal stability of the phosphors is crucial during the practical application of high-performance LEDs. Thus, the temperature-dependent emission spectra of ClAP: Sb^{3+} , ClAP: Eu^{2+} and ClAP: Tb^{3+} phosphors were examined using a fluorescence spectrophotometer with a computer-controlled electric furnace. The results shows both of ClAP: Sb^{3+} and ClAP: Tb^{3+} phosphors have good thermal stability, which is consistent with the results in previous reports ¹, ². However, the queching of ClAP: Eu^{2+} phosphor is serious, probably because Eu^{2+} is sensitive to the surrounding environment in this structure.

References:

- 1. J. Yu, C. Guo, Z. Ren and J. Bai, Optics & Laser Technology, 2011, 43, 762-766.
- J. Zheng, Q. Cheng, S. Wu, Z. Guo, Y. Zhuang, Y. Lu, Y. Li and C. Chen, *Journal of Materials Chemistry C*, 2015, 3, 11219-11227.



Fig. S2 KCl-LiCl binary phase diagram

In this paper, we synthesized ClAP microcrystallites via the melt salt method at a low temperature (600 °C), where LiCl and KCl with a molar ratio of 1:1 were used as the reaction medium. As shown in Fig. S2, when the temperature was 353 °C, the mixed salts began to melt, but there still was solid KCl. When the temperature reached about 462.5 °C, the reaction medium completely became a liquid phase.



Fig. S3 The histogram of SEM size of rod-shaped ClAP grains at different temperatures: a is length of ClAP grains; b is diameter of ClAP grains; c is long diameter ratio of ClAP grains



Fig. S4 The histogram of SEM size of rod-shaped CIAP grains at different molten salt ratio: a is length of CIAP grains; b is diameter of CIAP grains; c is long diameter ratio



Fig. S5 The histogram of SEM size of rod-shaped ClAP grains at different reaction time: a is length of ClAP grains; b is diameter of ClAP grains; c is long diameter ratio of ClAP grains