Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting information

$CaAlSiN_3:Eu^{2+}$ translucent ceramic: A promising efficient and robust red color converter for solid state laser displays and lighting

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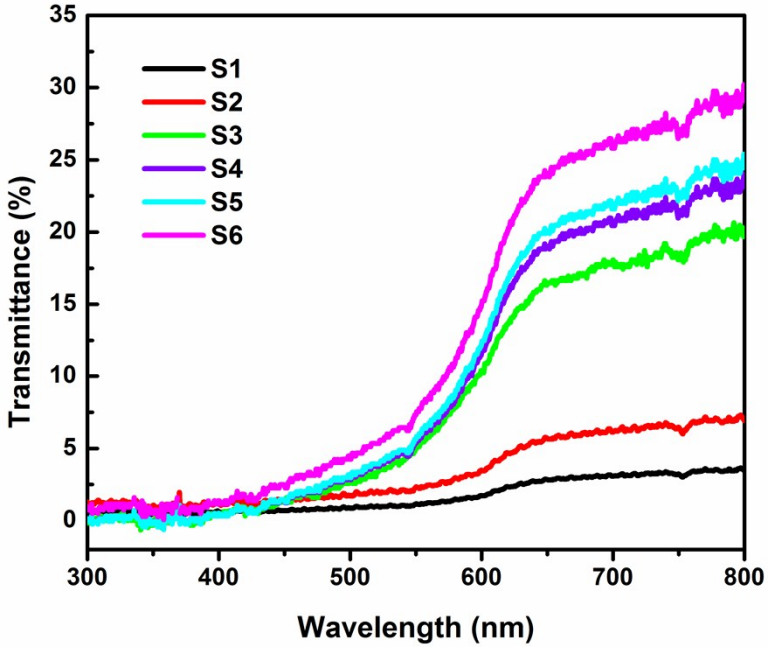

Fig. S1 The in-line transmittance versus wavelength for the processed translucent ceramics, and the highest transmittance of nearly 30% at 800 nm is observed for S6.

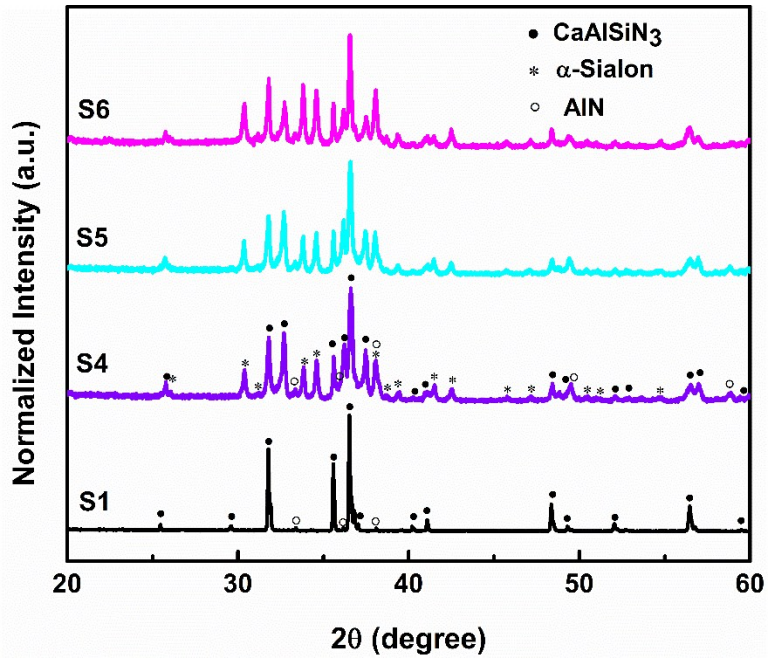

Fig. S2 XRD spectra of S1, 4, 5, 6. S1 (additives-free) contains no α-Sialon. The other samples consist of three crystalline phases: a major $CaAlSiN_3$ phase, a secondary α-Sialon phase, and a trace AlN.

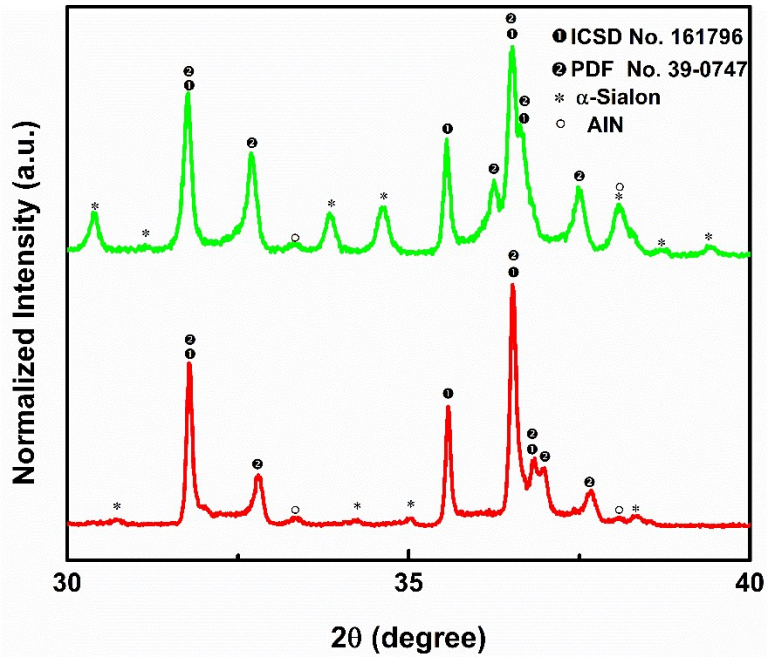

Fig. S3 XRD spectrum of S3 from 30 to 40 degree. The reflections assigned to the $CaAlSiN_3$ phase coincide with both the standard (ICSD No. 161796) and the distorted structure (PDF No. 39-0747). The distorted structure corresponds to a non-stoichiometric composition, i.e., $Ca_{1-x}Al_{1-x}Si_{1+x}N_{3-x}O_x$.

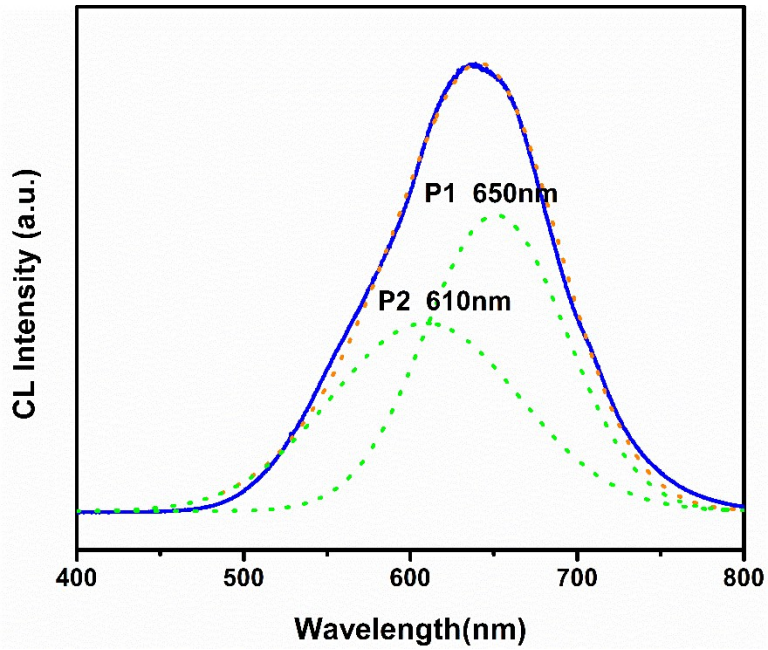

Fig. S4 The overall CL spectrum of S3 is composed of a strong band centered at ~ 650 nm and an obvious shoulder at short wavelength side. The emission can be deconvoluted into two sub-bands (i.e., 610 and 650 nm) by the Gaussian fitting, corresponding to the emissions of Eu^{2+} ions reside in the standard and distorted $CaAlSiN_3$ structure.

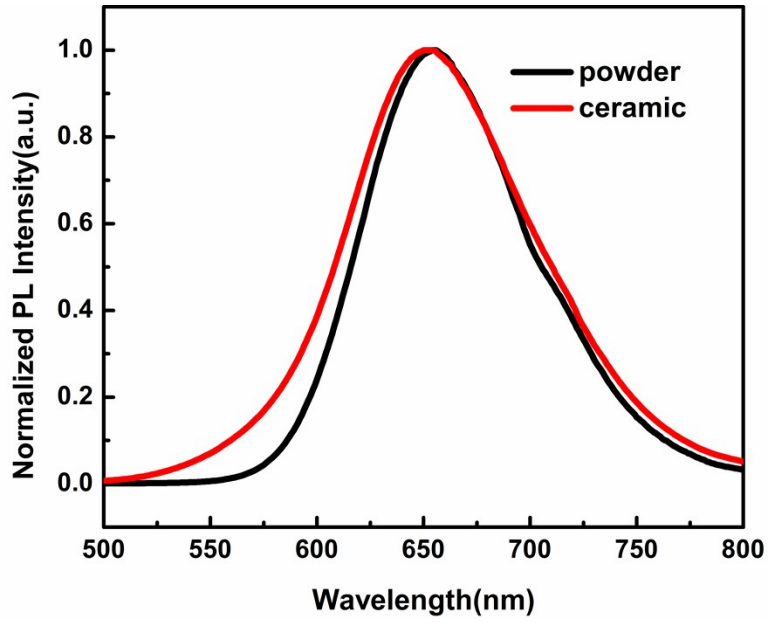

Fig. S5 The emission spectrum profile of the ceramic resembles that of the original $CaAlSiN_3:Eu^{2+}$ powders, but exhibits a spectral broadening due to the formation of two types of $CaAlSiN_3:Eu^{2+}$ with different emission spectra.

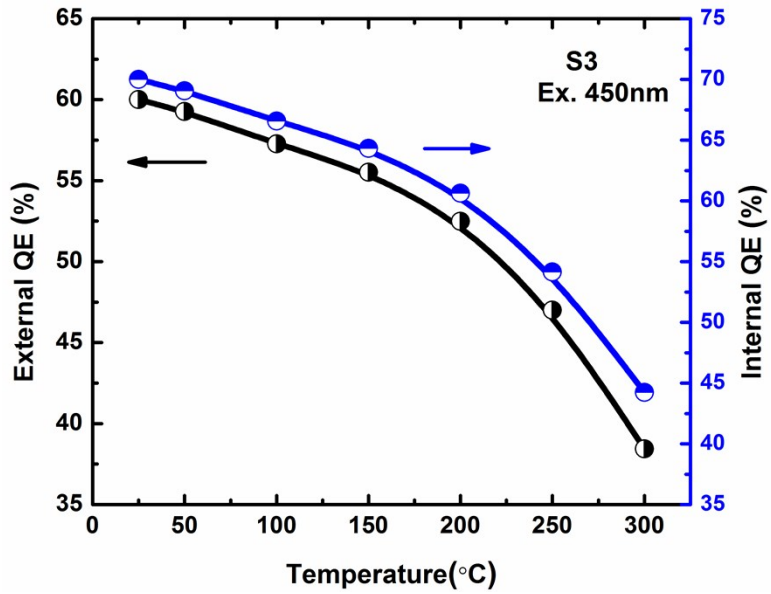

Fig. S6 Temperature-dependent quantum efficiency of S3. The good stability promises a high light conversion efficiency at elevated temperature.