Supplementary Materials

A promising all-inorganic green-emitting YAGG:Ce phosphor-in-glass for laser lighting

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Characterizations

The external quantum efficiency (EQE) was characterized by an intensified multi-channel photodetector (QE-2100, Otsuka Electronics, Japan) EQE, defined as the ratio of the emitted photons to the incident photons, was calculated based on the following Equation:

$$\eta_e = \frac{\text{number of photons emitted}}{\text{number of photons excited}} = \frac{\int \lambda p(\lambda)\mathrm{dx}}{\mathrm{dx}}$$

where η_e represents EQE, $P(\lambda)$ is the emission intensity. The internal quantum efficiency (η_i) is expressed as $\eta_i = \eta_e / \varepsilon_{abs}$, where ε_{abs} represents absorption efficiency of the sample [38]. The obtained samples had the high IQE and EQE because of the optimized glass composition and suitable sintering temperature, resulting that the phosphor can be protected well.

Supplementary Figures

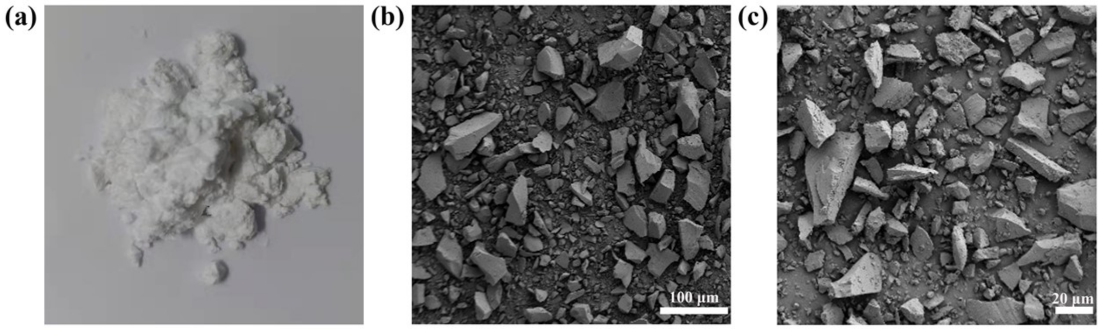

Fig. S1 (a) Photograph of the glass powders under daylight. (b) and (c) SEM images of the glass powders.

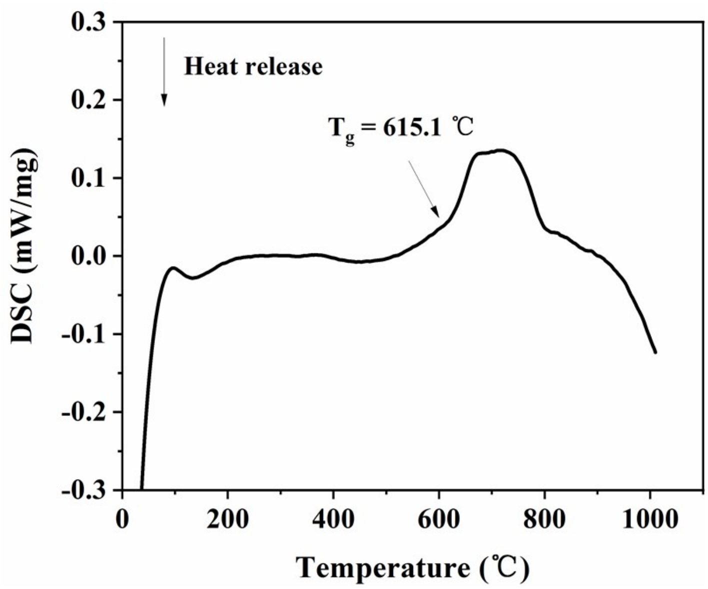

Fig. S2 DSC curve of glass frit.

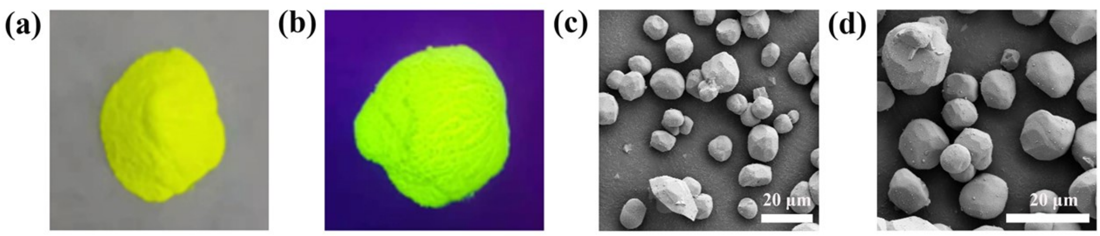

Fig. S3 Photographs of the phosphor under daylight (a) 365 nm UV light (b). (c) and (d) SEM images of the phosphor.

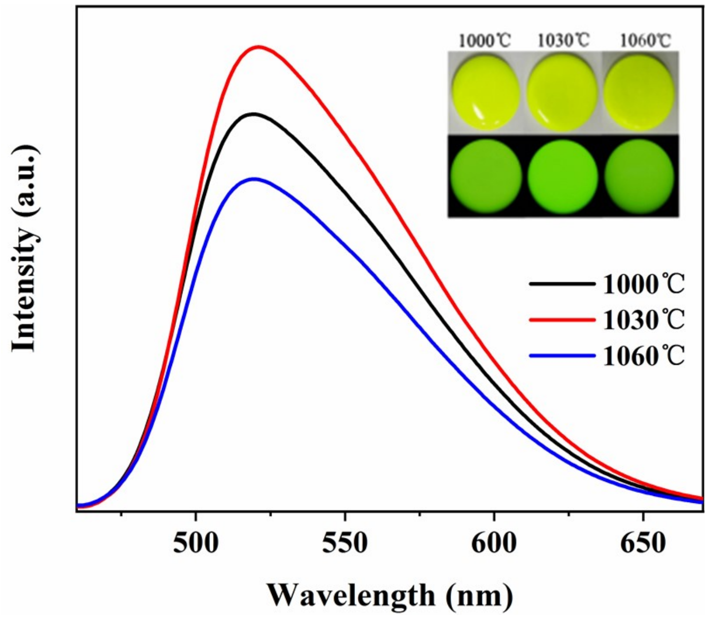

Fig. S4 PL spectra of 30 wt% PiG with various sintering temperature.

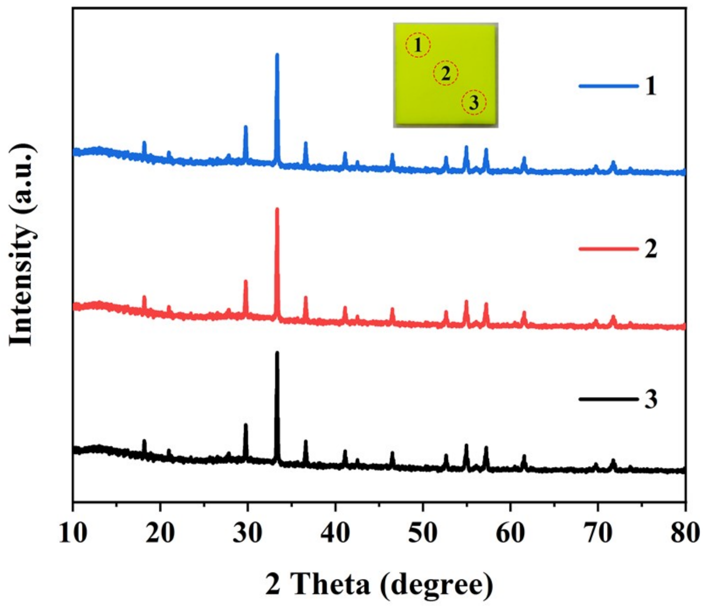

Fig. S5 XRD patterns of multiple locations within a sample.

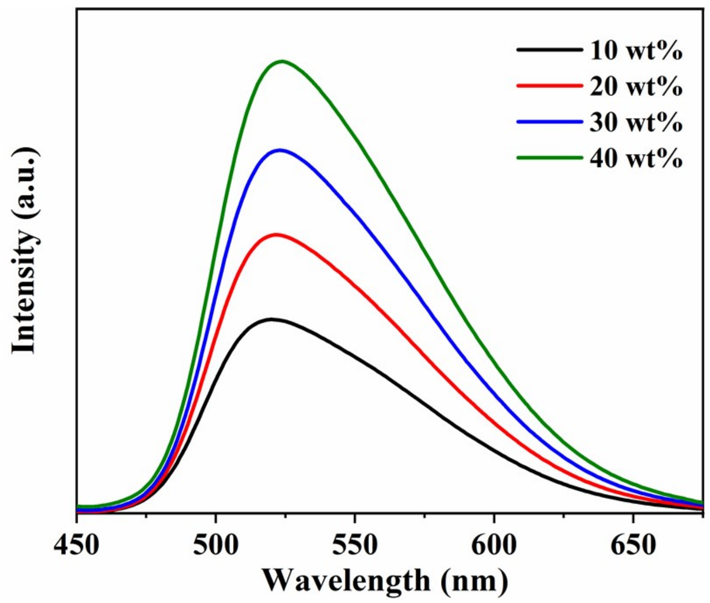

Fig. S6 The PL spectra (λ_{ex} = 347 nm) of the samples with different phosphor concentrations.

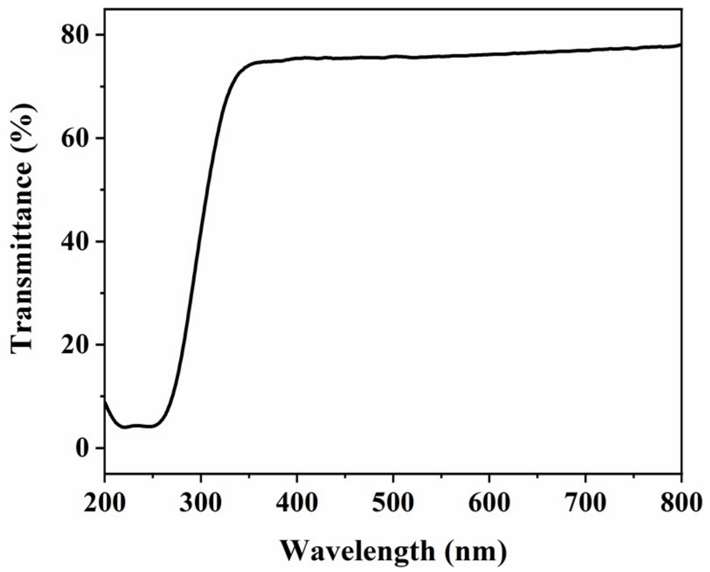

Fig. S7 Transmittance spectrum of the precursor glass.

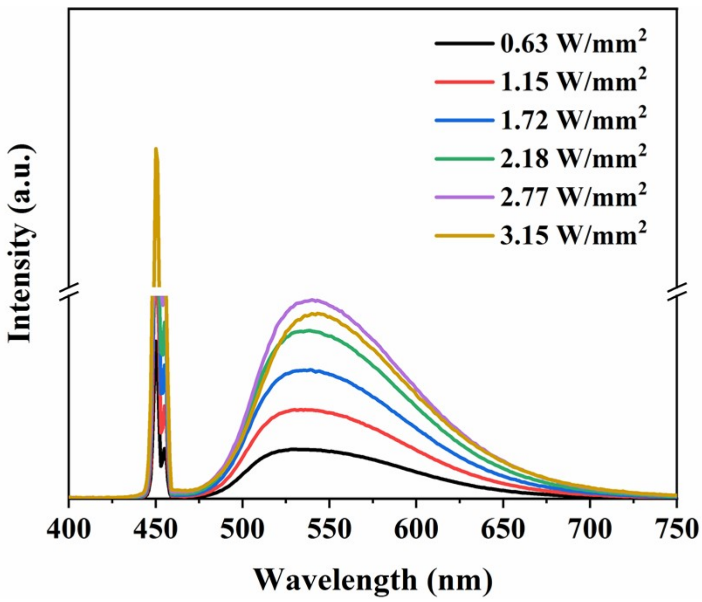

Fig. S8 The electroluminescence (EL) emission spectra of 30 wt% PiG sample (thickness: 0.9 mm) dependents on the blue laser power density.