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Electronic Supplementary Information

Searching for extra-high brightness laser-driven color converters by investigating thermally-induced luminance saturation

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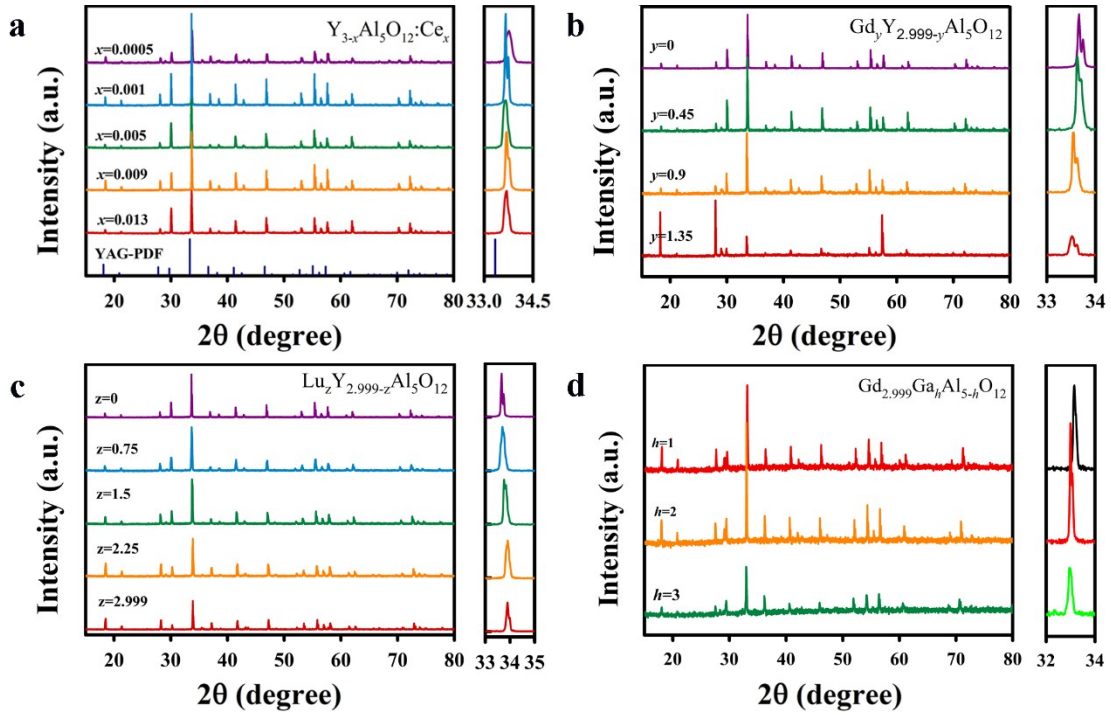

Figure S1. XRD patterns of (a) $Y_{3-x}Al_5O_{12}:Ce_x$ (x = 0.0005 ~ 0.013), (b) $Gd_yY_{2.999-y}Al_5O_{12}:Ce_{0.001}$ (y = 0 ~ 1.3), (c) $Lu_zY_{2.999-z}Al_5O_{12}:Ce_{0.001}$ (z = 0 ~ 2.999) and (d) $Gd_{2.999}Al_{5-h}Ga_hO_{12}:Ce_{0.001}$ (h = 1 ~ 3) ceramics.

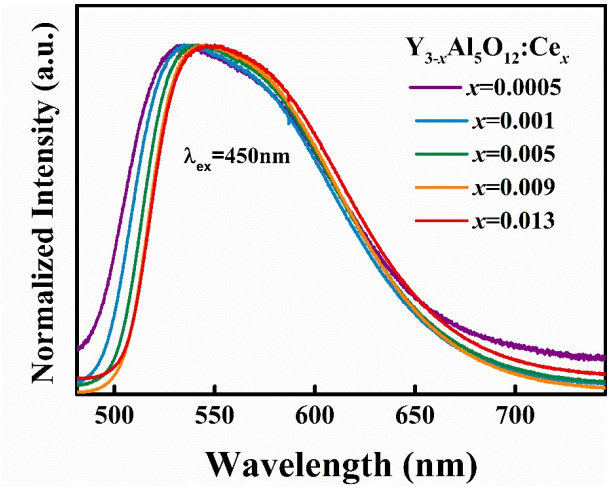

Figure S2. Normalized luminescence intensity *versus* the temperature of the YAG:Ce ceramics.

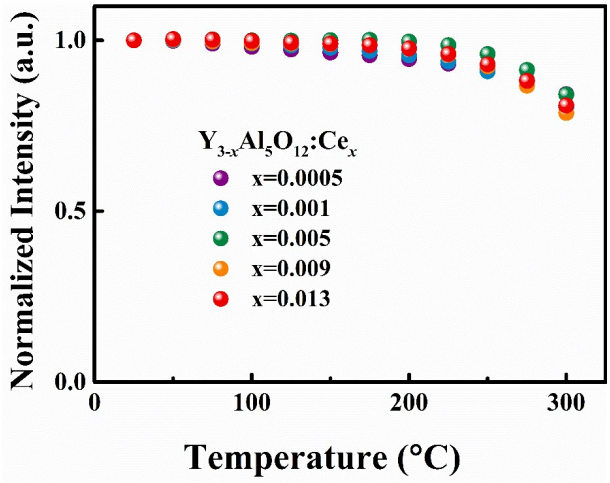

Figure S3. Normalized emission spectra of $Y_{3-x}Al_5O_{12}:Ce_x$ (x = 0.0005 ~ 0.013) ceramics (λ_{ex} = 450 nm).

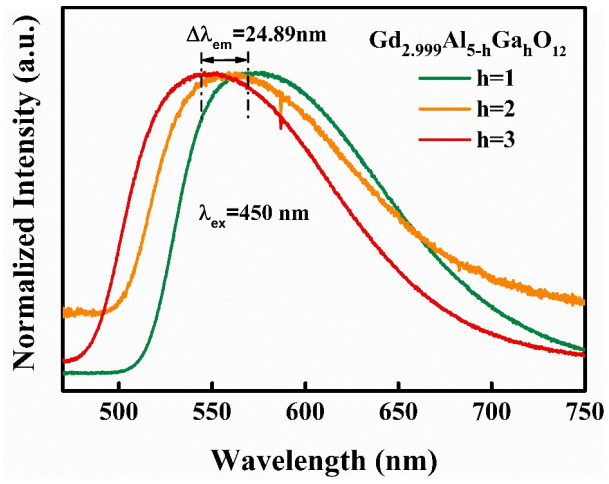

Figure S4. Normalized emission spectra of $Gd_{2.999}Al_{5-h}Ga_hO_{12}:Ce_{0.001}$ (h = 1 ~ 3) ceramics (λ_{ex} = 450 nm).

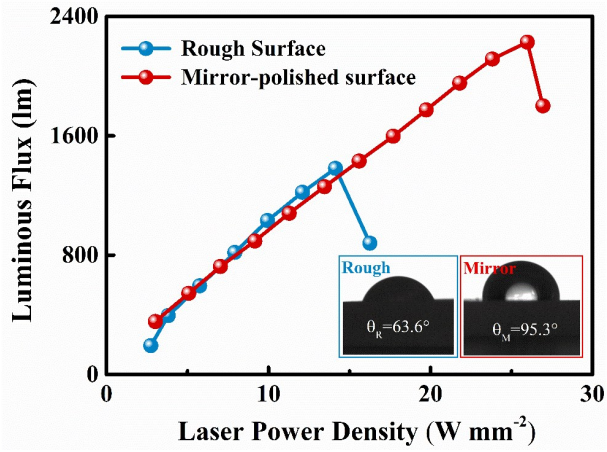

Figure S5. Thermal saturation evaluation for ceramics with different surface roughness. The insets show the corresponding contact angles.

Table S1. The relative densities (ρ_{rel}) of the sintered ceramics.

Samples	ρ_{rel} (%)
$x = 0.0005$	98.90
$x = 0.001$	98.12
$x = 0.005$	98.80
$x = 0.009$	99.12
$x = 0.013$	98.35
$y = 0.45$	98.68
$y = 0.9$	101.89
$y = 1.35$	100.08
$z = 0.75$	101.70
$z = 1.5$	99.20
$z = 2.25$	99.59
$z = 2.999$	99.94
$h = 1$	98.45
$h = 2$	98.67
$h = 3$	98.21

Video S1. The disastrous crack happens to the ceramics when the power density increases beyond the saturation threshold.

Video S2. The increase in temperature under the excitation of saturation thresholds in a fairly short time for $Y_{3-x}Al_5O_{12}:Ce_x$ ceramics: (a) $x = 0.001$, (b) $x = 0.005$, (c) $x = 0.009$ and (d) $x = 0.013$.