Supporting Information

Cr³⁺ luminescence based ratiometric optical laser power meter

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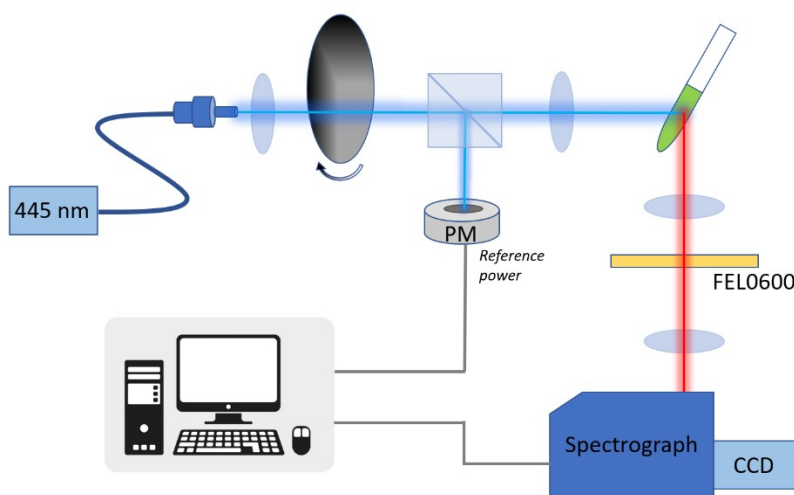

Figure S1. Schematic representation of the experimental setup used for emission spectra measurement as a function of excitation density.

Crystal field strength parameter Dq/B can be determines as follows:

$$Dq = \frac{E(4A2 \rightarrow 4T2)}{10} \tag{S1}$$

$$x = \frac{E(4A2 \rightarrow 4T1) \ - \ E(4A2 \rightarrow 4T2)}{Dq}$$

(S2)

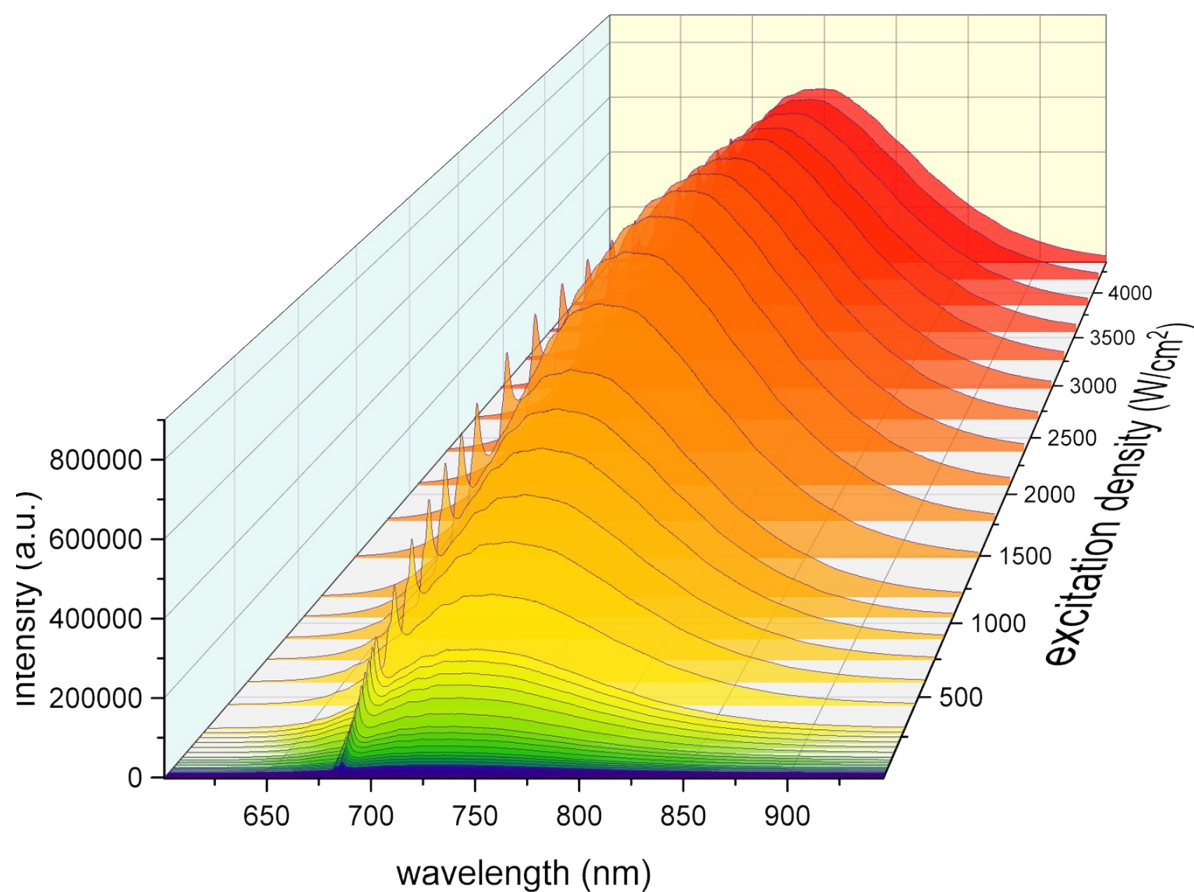$$\frac{Dq}{B} = \frac{15(x \ - \ 8)}{(x^2 - 10x)}$$

(S3)

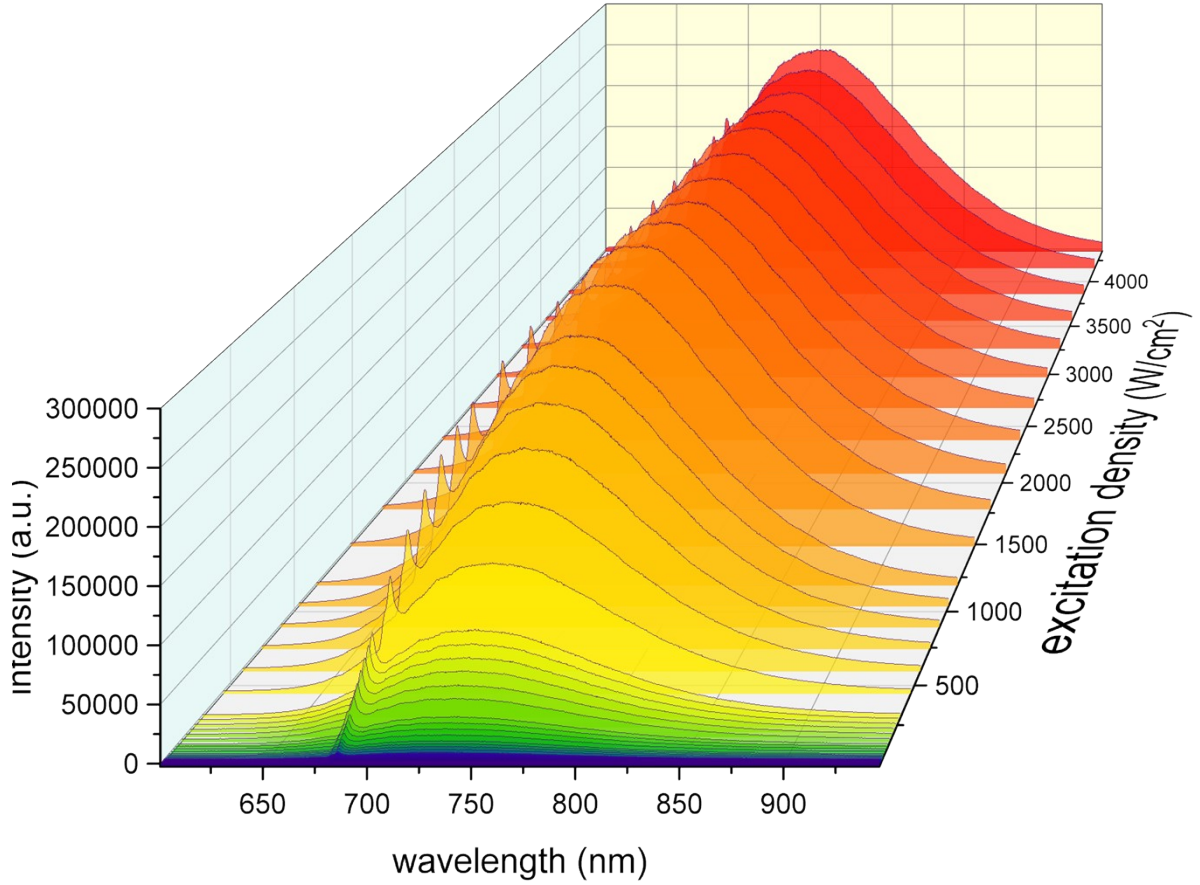**Figure S2**. Emission spectra of $GdAl_3(BO_3)_4$:5%Cr^{3+} measured as a function of excitation density (λ_{exc}=445 nm).

Figure S3. Emission spectra of $GdAl_3(BO_3)_4$:10%Cr^{3+} measured as a function of excitation density (λ_{exc}=445 nm).

The nonradiative transition probability can be determined as follows:

$$W_{nr} = 1/\tau_o - 1/\tau_{exp} \qquad (S4)$$

where τ_0 and τ_{exp} represent the radiative and experimental values of lifetime.

In this particular case, we assumed that τ achieved for 0.01%Cr^{3+} can be used as a τ_0=220 μs. The following values of τ_{avr} were achieved τ_{avr}=109 μs, τ_{avr}=65 μs and τ_{avr}=26 μs for 1%Cr^{3+}, 5%Cr^{3+} and 10%Cr^{3+}, respectively.
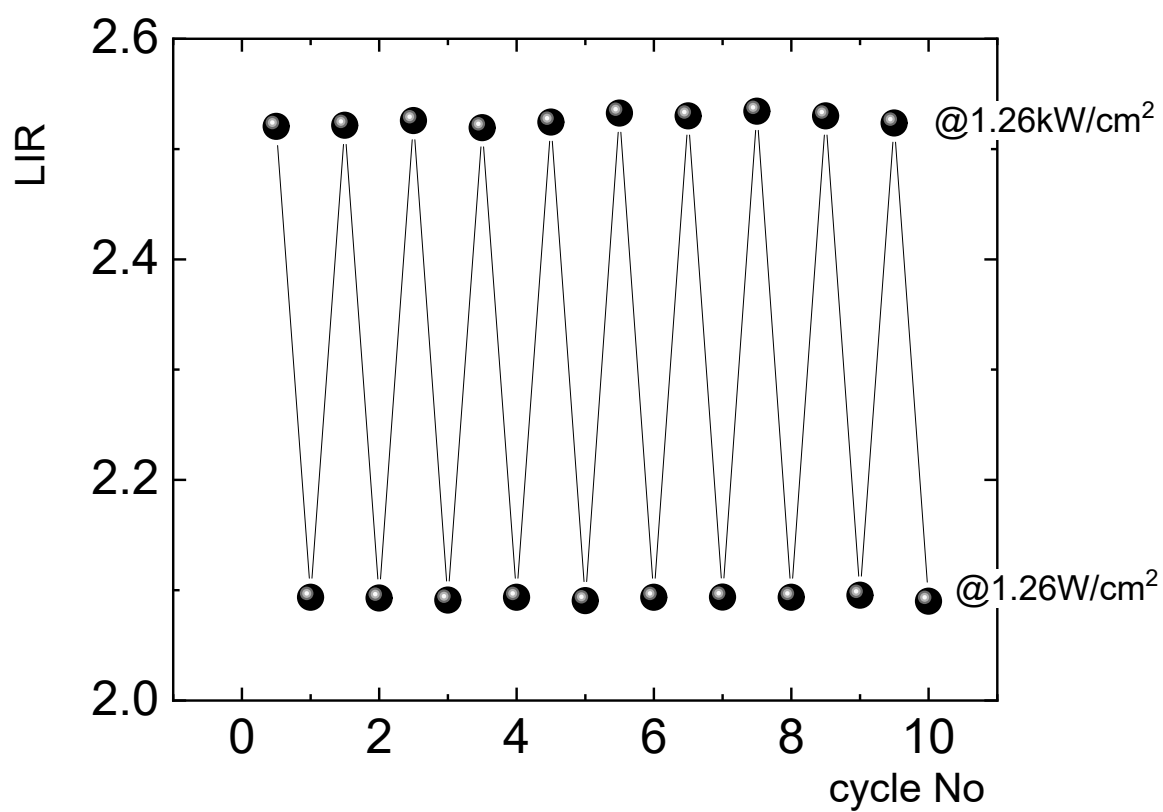
Figure S4. The measurement of LIR of $GdAl_3(BO_3)_4:1\%Cr^{3+}$ measured in a function of low and high excitation densities cycles.
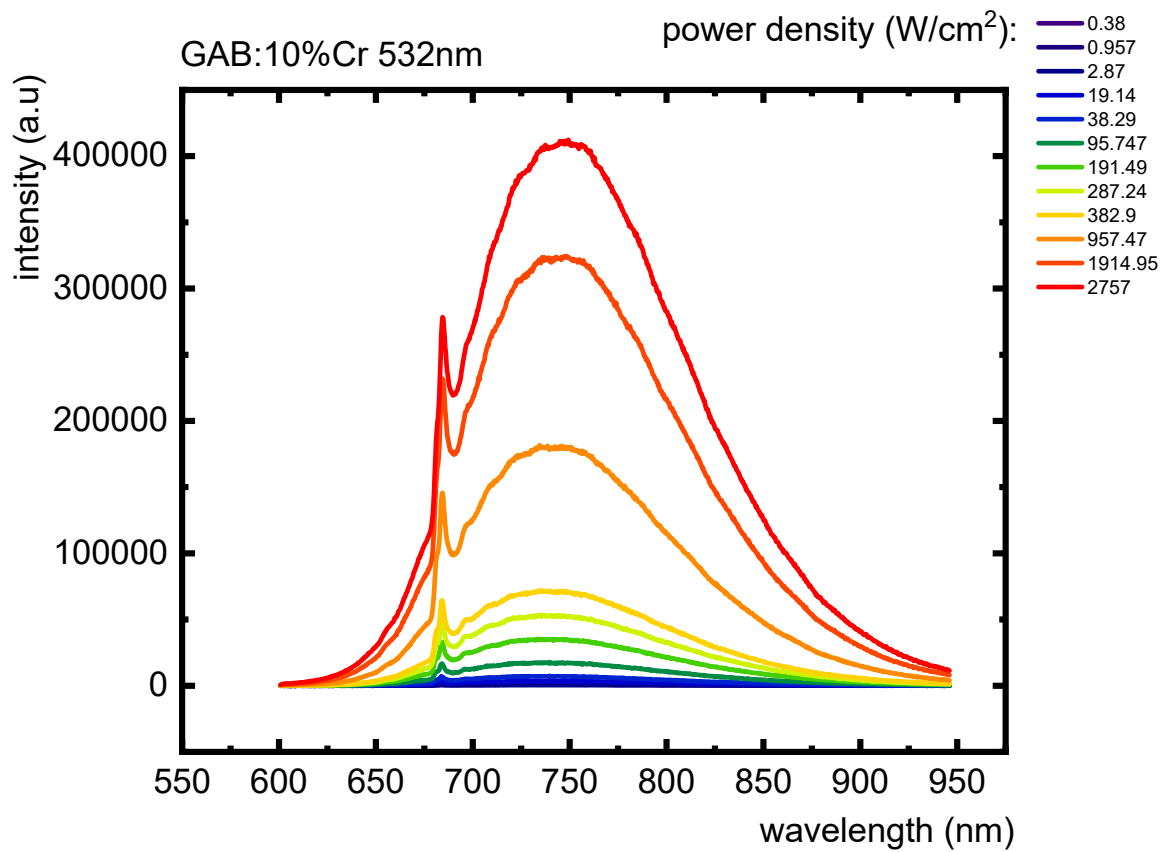
Figure S5. Emission spectra of GdAl$_3$(BO$_3$)$_4$:1%Cr^{3+} upon λ_{exc}=532 nm of different excitation densities.