

The Role of Nitrogen Vacancy in Optical Transitions in GaN

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Introduction:

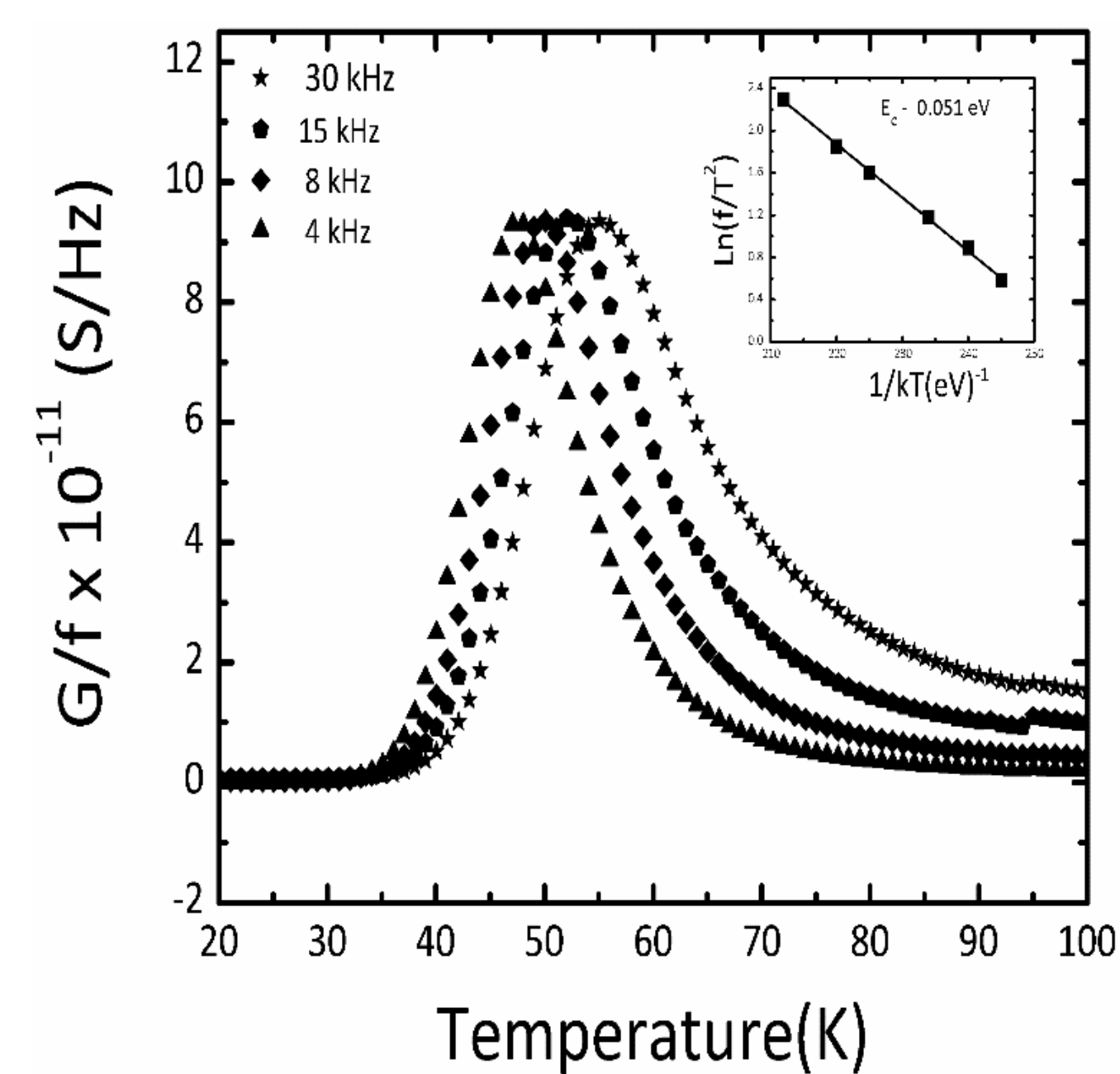
GaN importance to technology:

- LED, LD, UV & Solar Blind detection

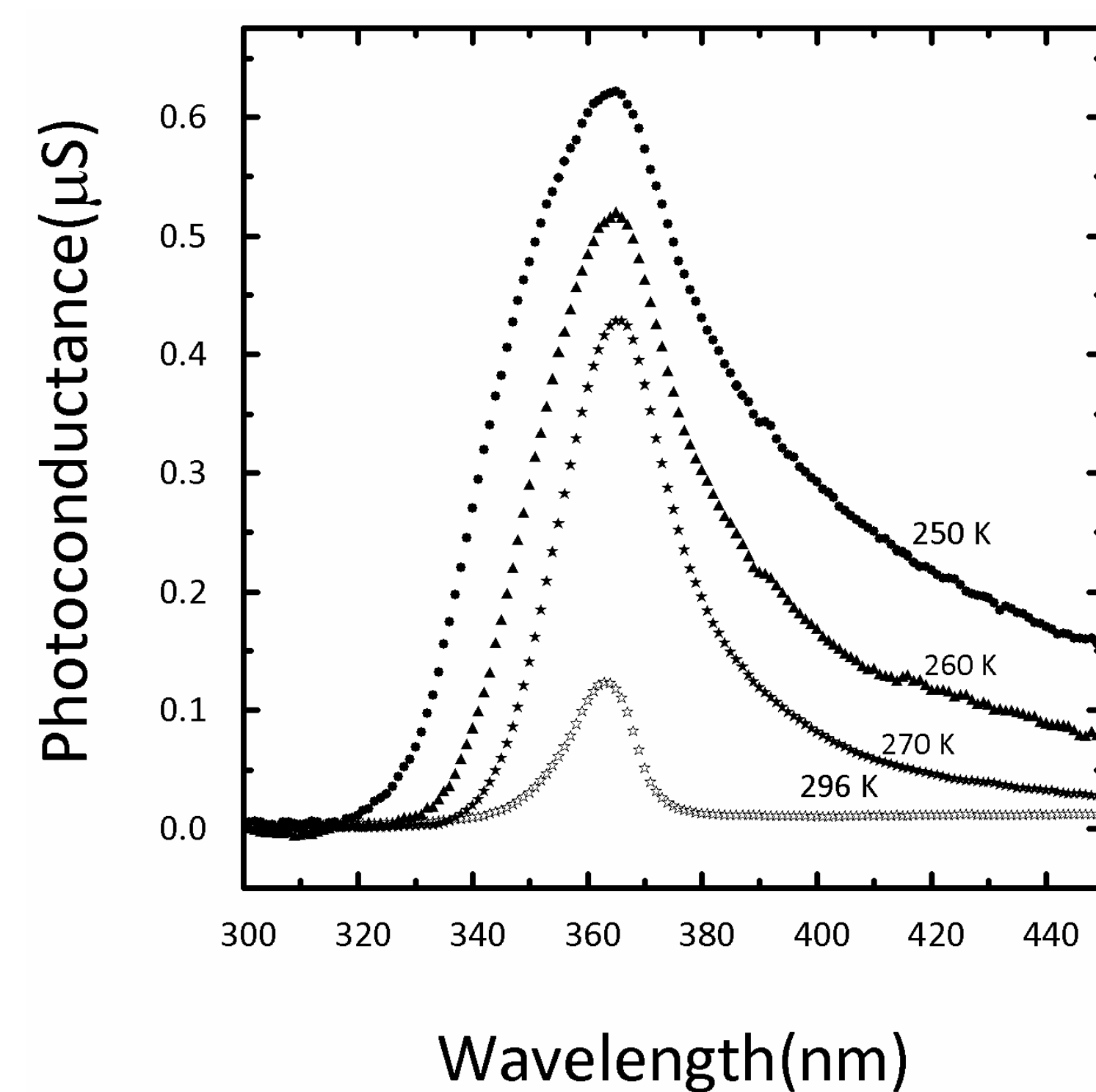
Band Gap

- Important parameter in semiconductors

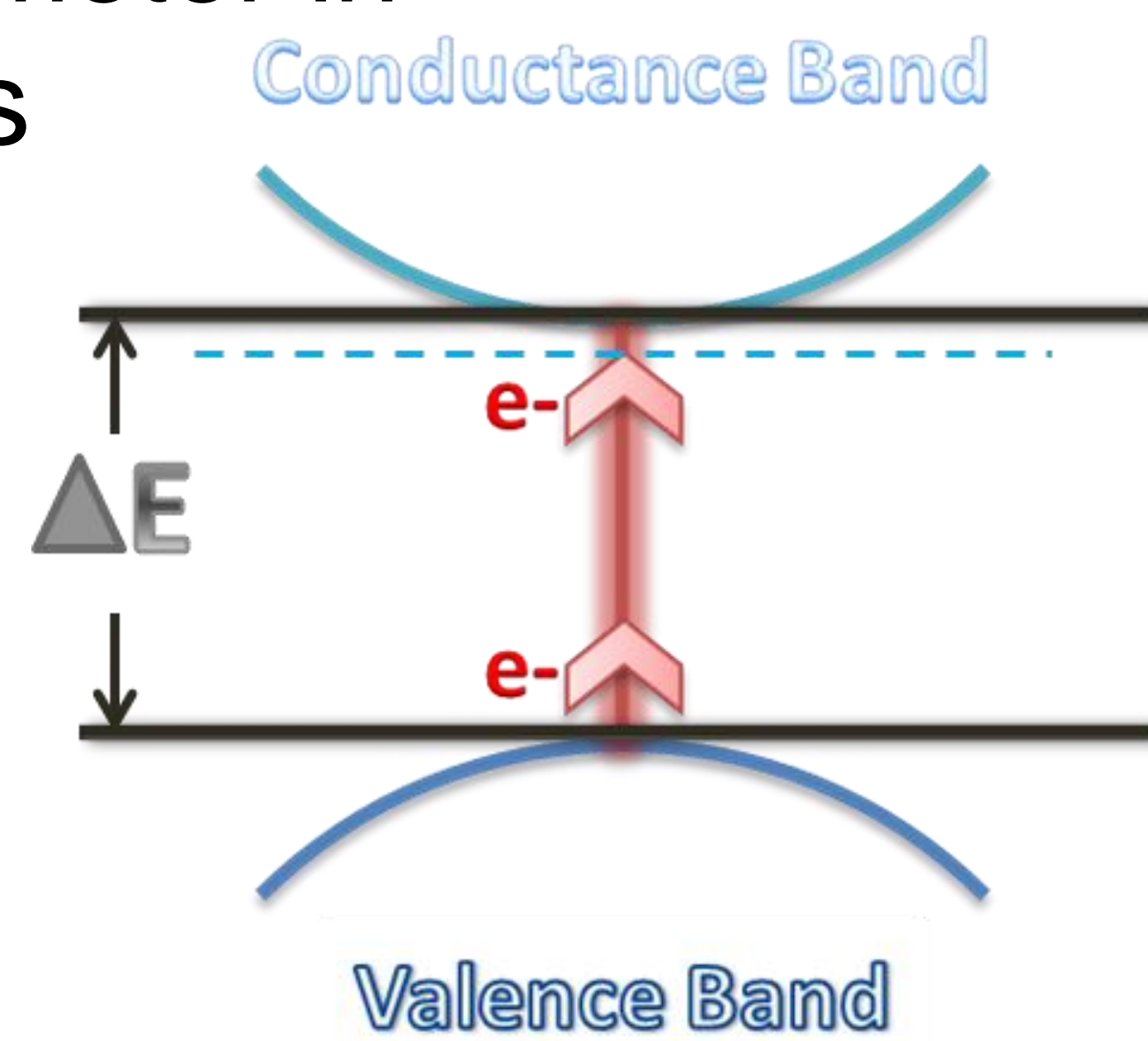
Results:



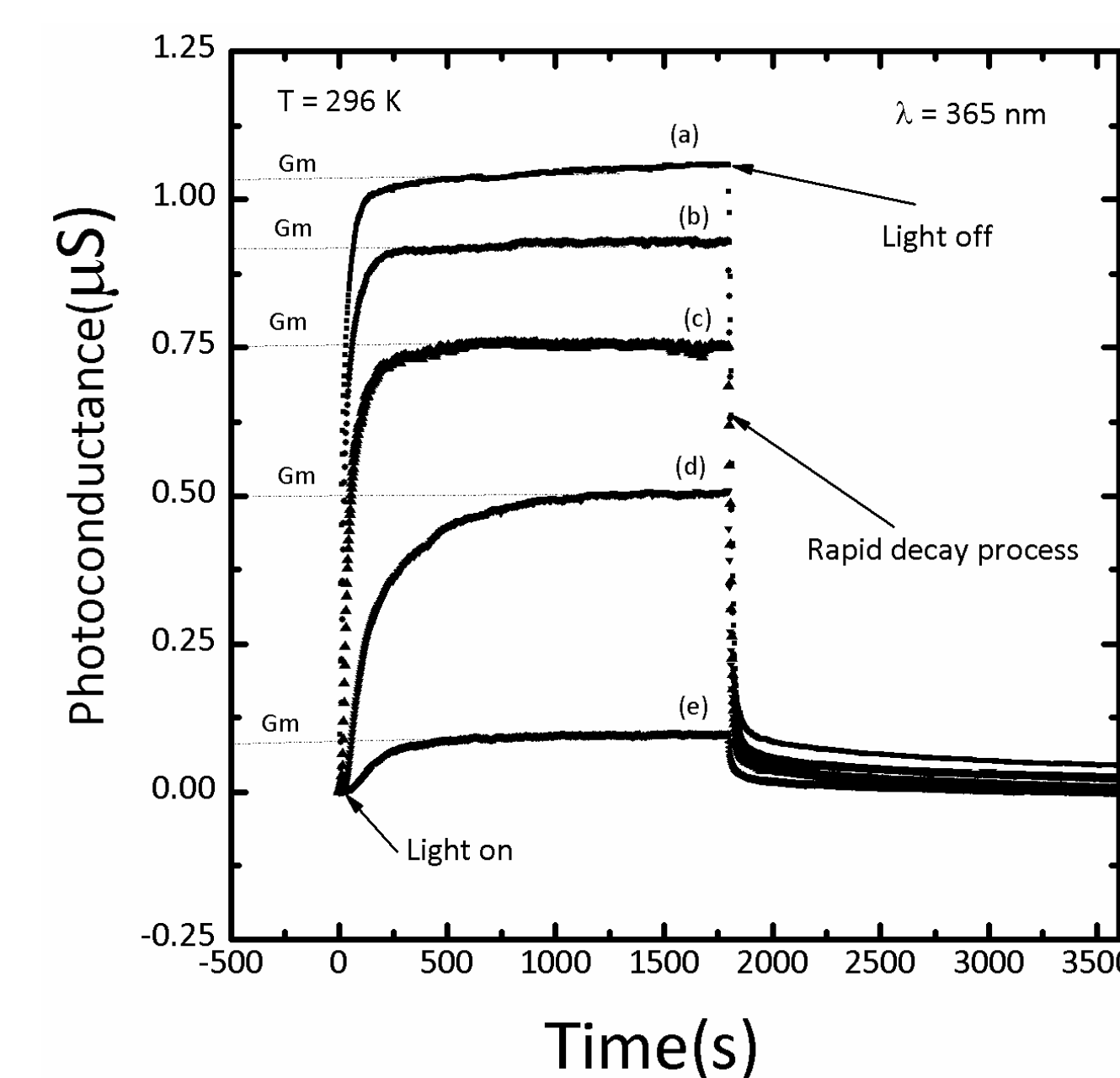
Normalized (G/f) Thermal Admittance Spectroscopy (TAS) spectra taken at varied measuring frequencies.



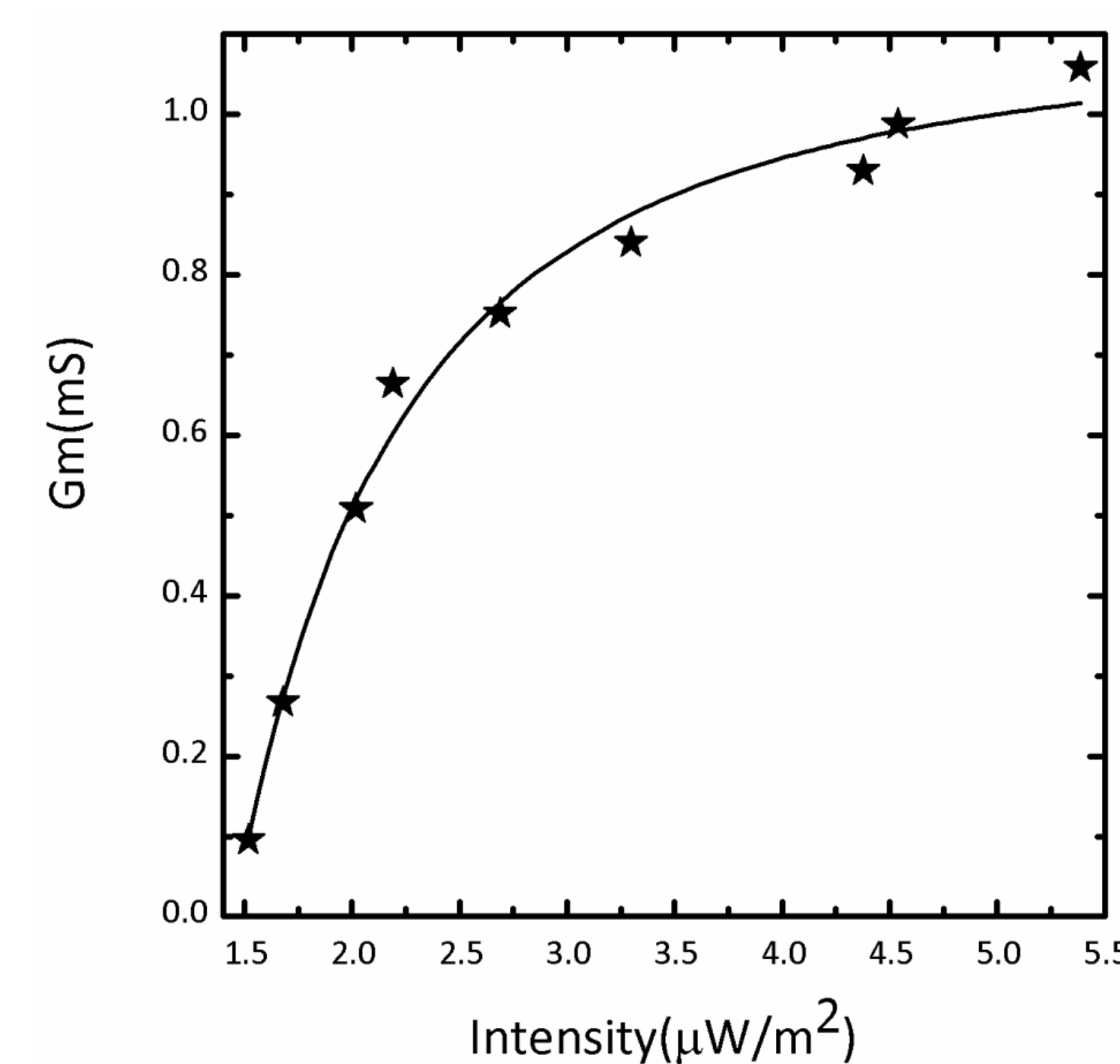
Optical Admittance Spectra of an undoped n-type GaN measured at representative temps. $\lambda_{\text{peak}} = 365 \text{ nm}$.



OAS spectrum shows G, which is proportional to the flux incident on the sample, rises rapidly to G_m .

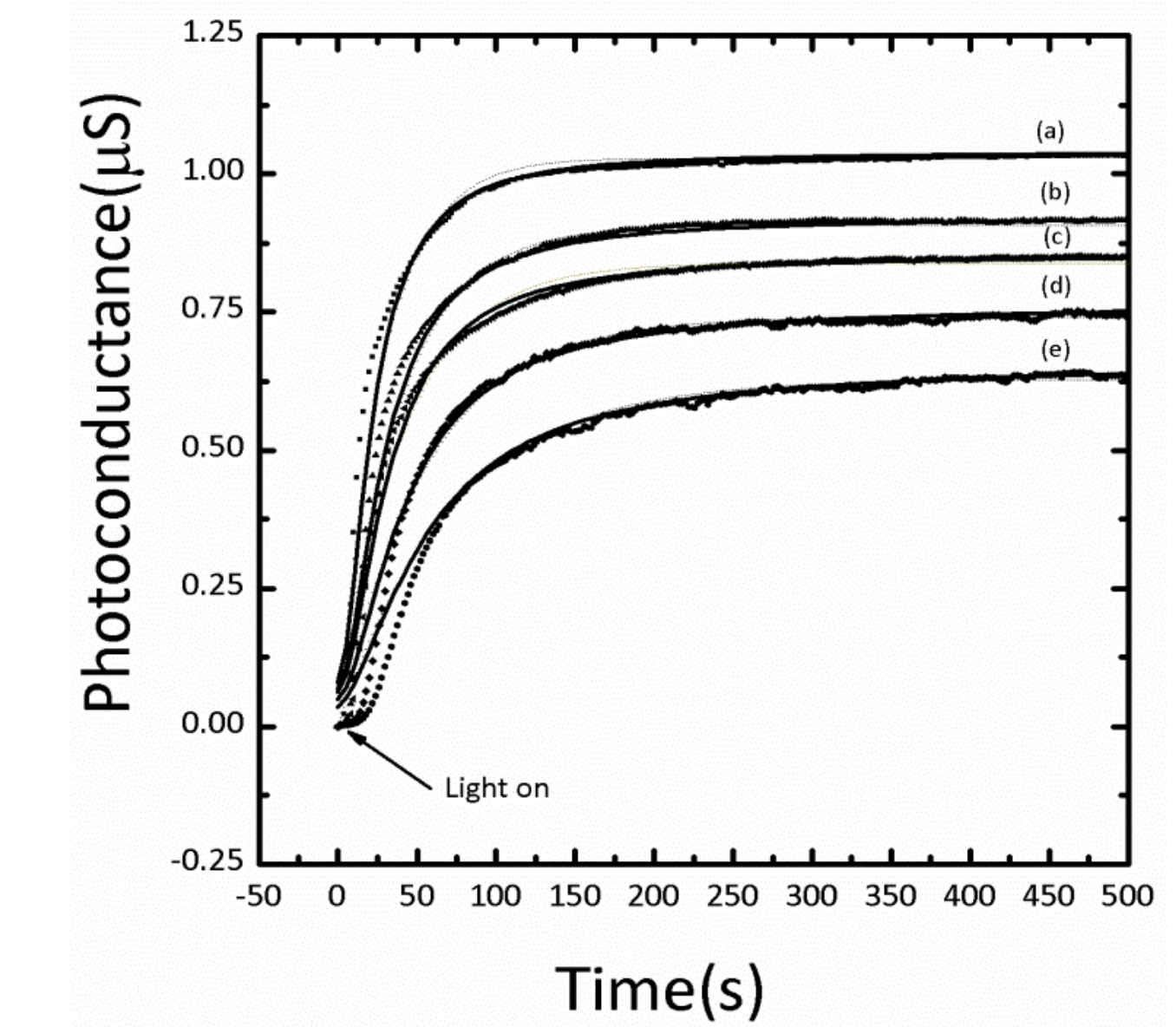


Comparison of G_m as a function of excitation light intensity.

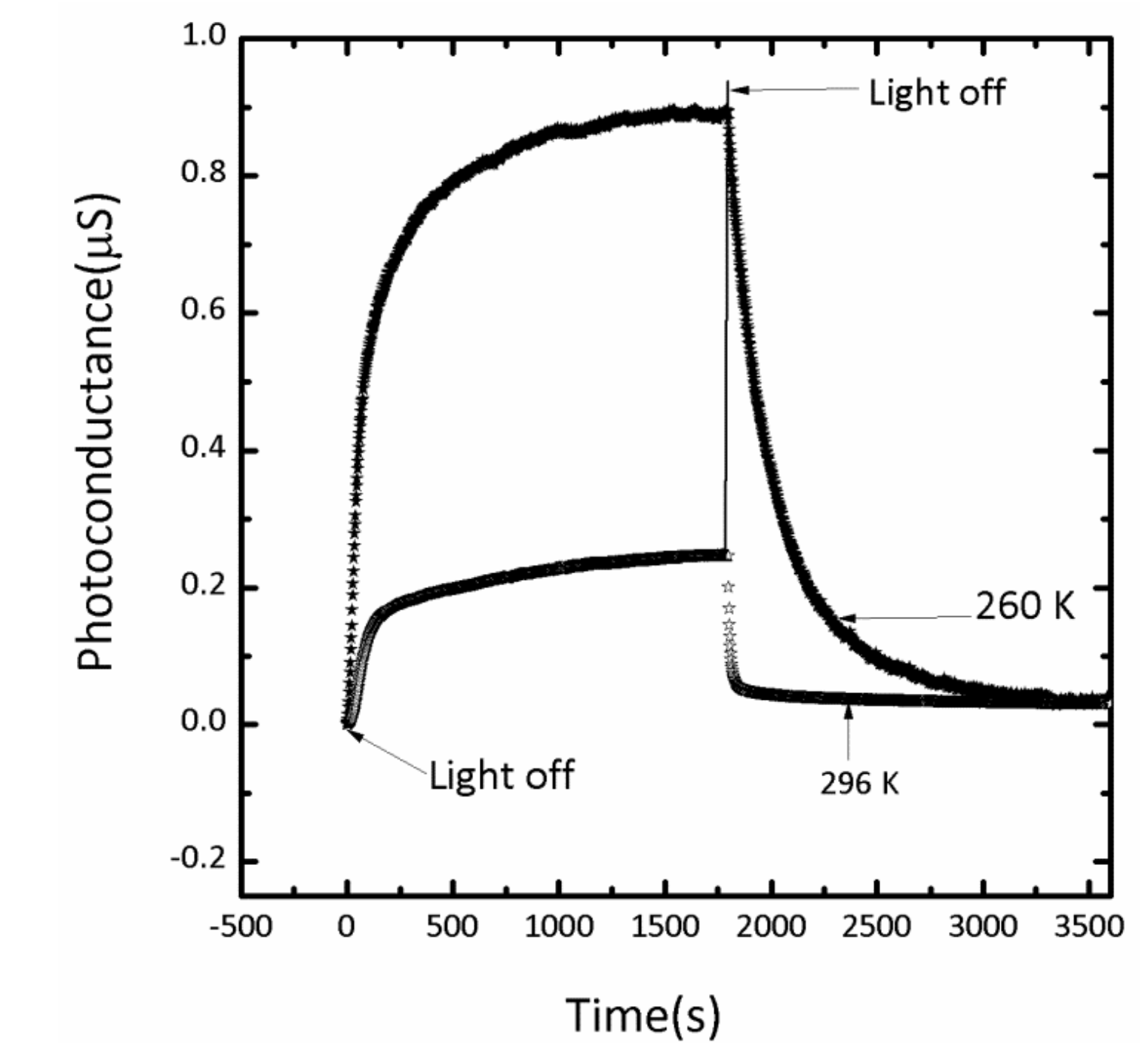


Variation of G_m as a function of excitation light intensity.

$$G(t) = G_m \left(1 - \exp\left(-\frac{t}{\tau}\right) \right)$$

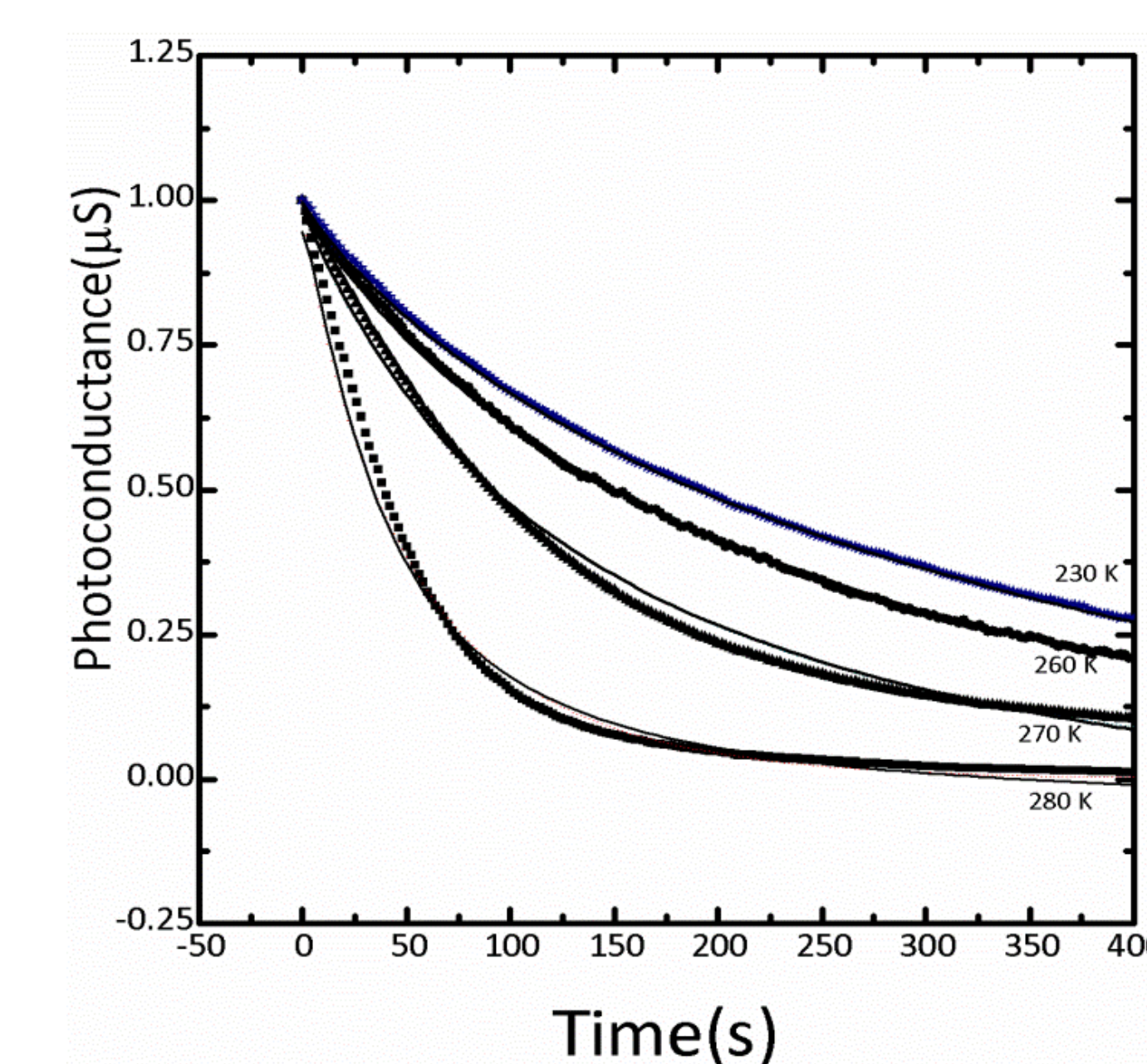


Buildup of G transients taken at representative excitation light intensities of 5.39, 4.38, 3.30, 2.69, & 2.19 [$\mu\text{W}/\text{m}^2$], but with fixed temp & λ .



Comparison of the G transient of the sample at different temps. Held constant illumination ($\lambda = 365 \text{ nm}$) and light intensity for each plot.

$$G(t) = \exp\left[-\left(\frac{t}{\tau}\right)^{\beta}\right]$$



When the excitation light was terminated at $t = 0$, G decays were normalized to unity. This figure shows normalized curves at representative temps.