



## **Emission Intermittency in Nano-Size Agglomerations of Green-Fluorescent Graphene Quantum Dots**

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We report on temporal characteristics and temperature dependence of the photoluminescence (PL) of aggregated ensembles of graphene quantum dots (GQDs). We show that under CW excitation, GQDs ensembles demonstrate temperature-dependent intermittent emission, i.e., "blinking" with tendency to shorten "blinking" times with increase of temperature. We also revealed PL hysteresis under excitation with microsecond laser pulses.

The studied samples were prepared by drop-casting GQDs aqueous suspension stabilized with a polymer onto a clean silicon substrate with subsequent drying. As revealed Atomic force and scanning electron microscopy revealed that the obtained film was composed of nano-size agglomerations of the GQDs embedded in the polymer. The bright green line centered at 546 nm dominates the PL spectrum of the fabricated film. Under CW excitation, the PL signal decreases with time, however it recovers in the dark. The temporal evolution of the PL signal strongly depends on the sample temperature. Specifically, the higher the temperature, the faster the PL decay, while at the temperature drop, the fluorescence intensity shows several stages of growth.

When the fluorescence of the GQDs was excited by symmetrical triangular pulses, the pronounced hysteresis of the PL signal, which originates from the transitions of the GQDs between emissive and non-emissive states, was observed. The population of the non-emissive states and, consequently, "blinking" of the GQDs can be controlled by changing temperature.

The obtained results suggest that this type of GQDs and even nano-size agglomerations of them can be useful as controlled fluorophores for super-resolving microscopy, and particularly for implementation in stochastic optical fluctuation imaging (SOFI) microscopy for super-resolution imaging of biological samples.

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