Supplementary Information

Synthesis and Optical Properties of Water-Soluble CdTe:Zn^{2+} Quantum Dots Prepared by the One-Pot Approach

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Determination of the fluorescence quantum yield

Fluorescence quantum yield (FQY) for CdTe:Zn^{2+} QDs were determined by the method presented by Horiba[1] using rhodamine 6G (QY = 0.95) as standard sample. Briefly, rhodamine 6G stock solution was prepared dissolving 4.8×10^{-3} mmol in 50 mL of water. Different aliquots of this solution were pipetted into a volumetric flask and then the volume was measured with deionized water to 10 mL so that the optical density of the solution was in the range of 0.01 to 0.001, according to Maître and co-workers.[2] To obtain the standard curve, the solutions had their optical density (OD) and integrated fluorescence band intensity (IFBI) values recorded at the wavelength of 355 nm. With the ordered pairs (DO, IFBI), the linear regression method was applied, obtaining the angular coefficient (Grad) of the curve. After performing the same procedure to CdTe:Zn^{2+} quantum dots, the equation 1 was applied.

$$\varphi_X = \varphi_{ST}\left(\frac{Grad_X}{Grad_{ST}}\right)\left(\frac{\eta_X^2}{\eta_{ST}^2}\right) \quad (1)$$

The subscripts X and ST represent the test sample and the standard, respectively. Grad corresponds to the slope of the straight line obtained by plotting integrated fluorescence intensity *vs.* absorbance and η is the solvent refraction index. In this case, we disregarded the refraction index, because water was used as solvent to prepare both highly diluted solutions. Using the gradients obtained for the curves and equation 1, FQY (φ) were obtained.

To exemplify the method, we present the calculation for CdTe:Zn^{2+} (30 min synthesis) QDs, as illustrated in Figure S1.

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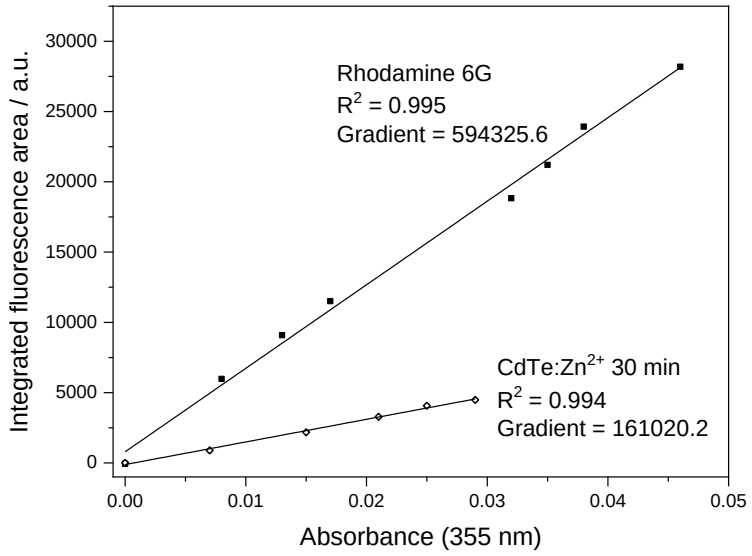

Figure S1. Estimation of the FQY of CdTe:Zn^{2+} (30 min synthesis) QDs in relation to the fluorescent pattern rhodamine 6G.

Using the gradients obtained for the curves presented in Figure S1, we used equation 1 and obtained FQY for CdTe:Zn^{2+} 30 min equal to 26%:

$$\varphi_{\text{CdTe:Zn 30 min}} = 0.95\left(\frac{161020.2}{594325.6}\right) = 0.26 \quad (2)$$

References

1. Horiba Scientific; *A Guide to Recording Fluorescence Quantum Yields*; available at http://www.horiba.com/fileadmin/uploads/Scientific/Documents/Fluorescence/quantumyieldstrad.pdf, accessed in June 2018.

2. Laverdant, J.; de Marcillac, W. D.; Barthou, C.; Chinh, V. D.; Schwob, C.; Coolen, L.; Benalloul, P.; Nga, P. T.; Maître, A.; *Materials* **2011**, *4*, 1182.