Photon Antibunching in a Cluster of Giant CdSe/CdS Nanocrystals

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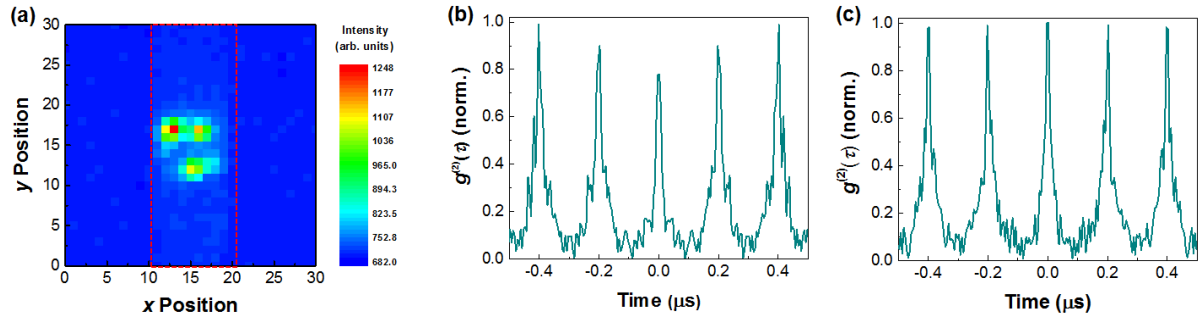
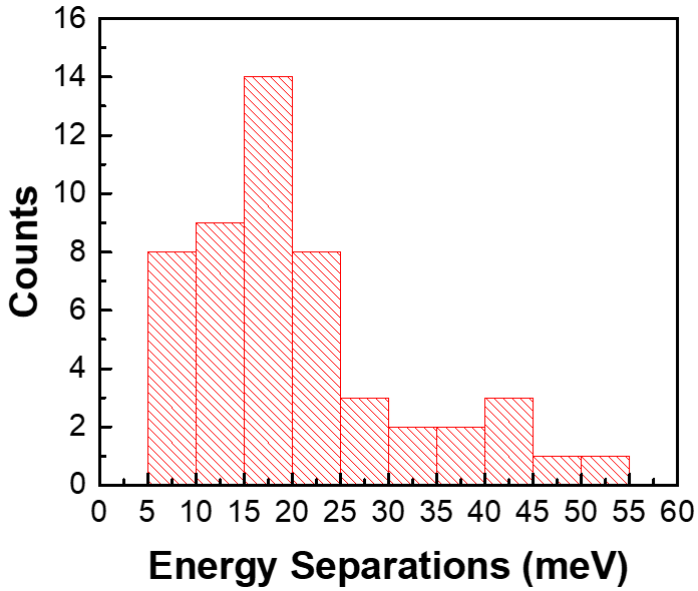
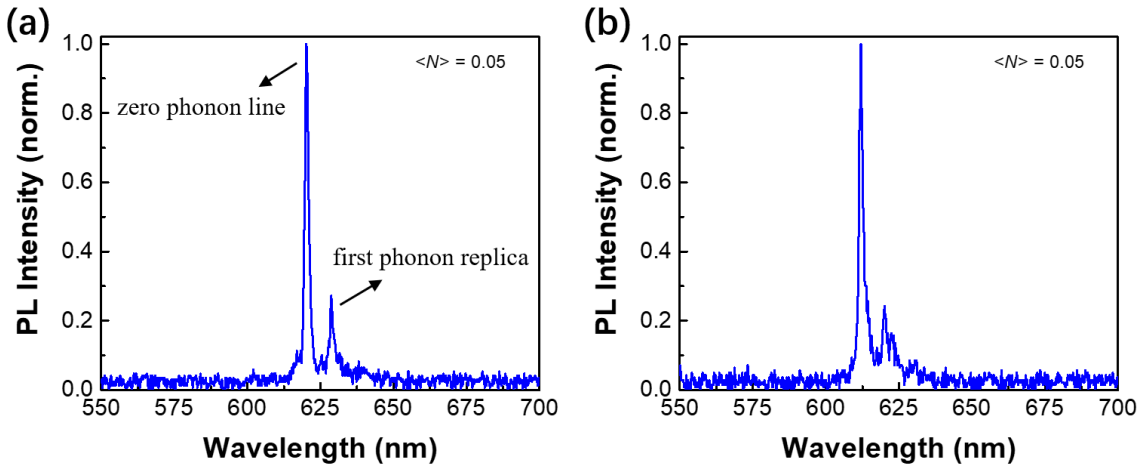


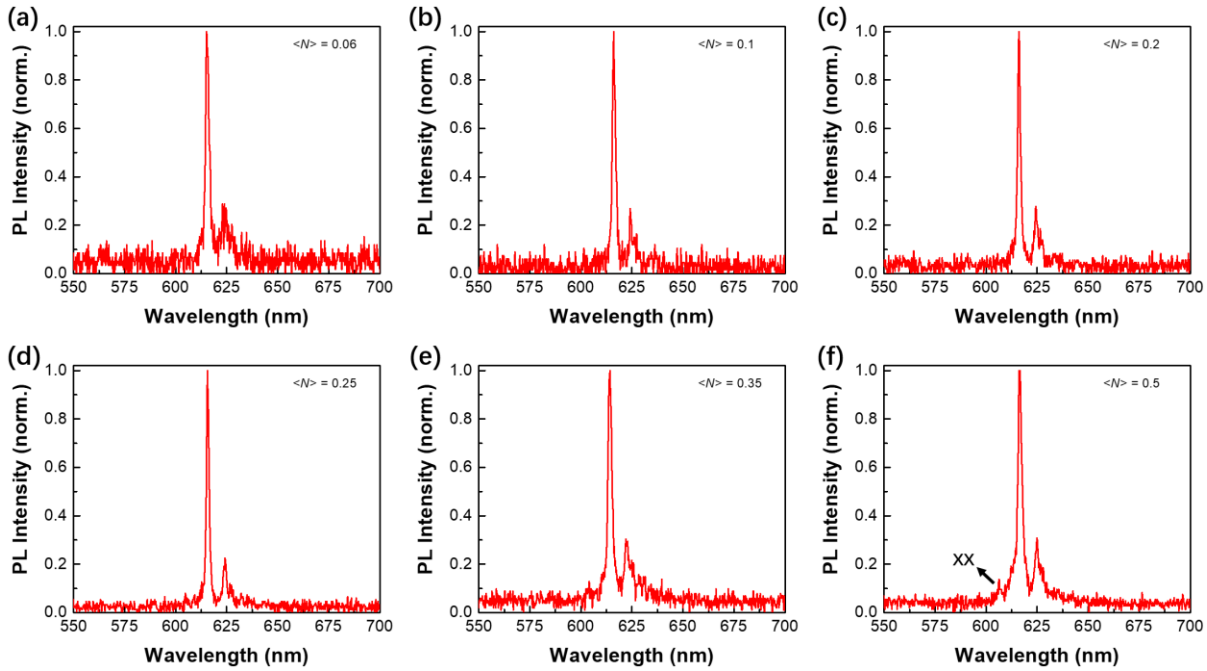
Supplementary Figure 1 | Photon antibunching measurements of several isolated gNCs. **(a)** Photoluminescence (PL) image of three isolated CdSe/CdS gNCs excited at $\langle N \rangle = 0.1$ with an acquisition time of 1 s. The red dotted box marks the profile of the spectrometer entrance slit corresponding to a sample region of 3.2 μm × 9.6 μm. **(b)** Second-order photon autocorrelation measurement of these three gNCs with a $g^{(2)}(\tau)$ value of 0.78 at the zero-time delay. **(c)** Second-order photon autocorrelation measurement of >5 gNCs with a $g^{(2)}(\tau)$ value approaching one at the zero-time delay. The above optical measurements were performed at the cryogenic temperature of 4 K.



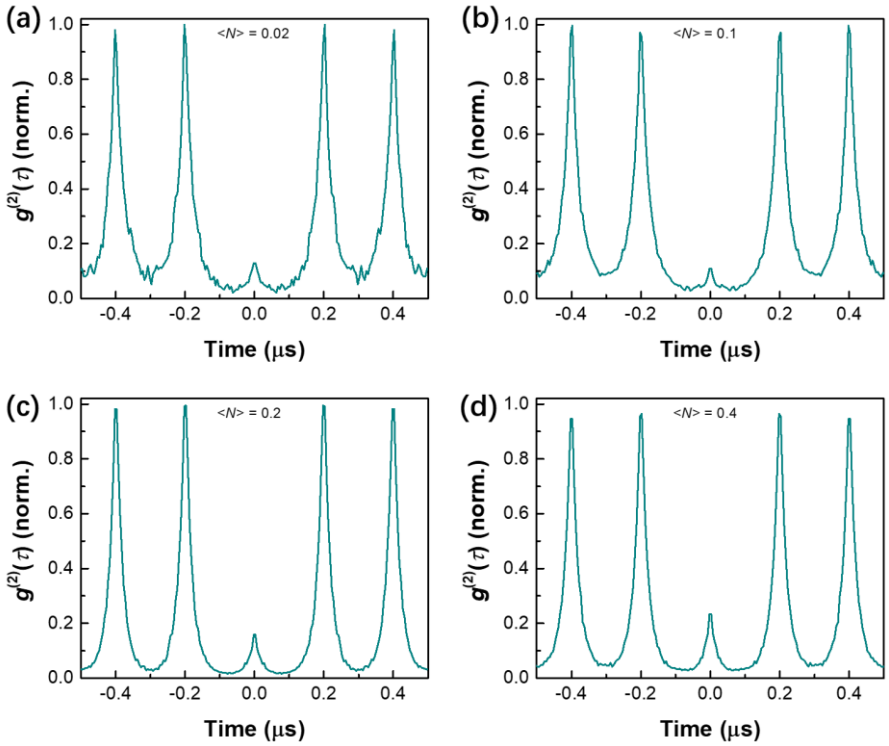
Supplementary Figure 2 | Energy separations of nearby PL peaks in single gNCCs. Statistical histogram for the energy separations between all the nearby peaks in the PL spectra of >30 single gNCCs excited at 4 K with $\langle N \rangle$ = 0.1.



Supplementary Figure 3 | PL spectra of individual gNCs measured at 4 K. (a), (b) PL spectra measured with an integration time of 1 s for two representative gNCs excited at <*N*> = 0.05 with the energy separations of 27.5 and 26.5 meV, respectively, between the zero phonon line and the first phonon replica.



Supplementary Figure 4 | PL spectra of an individual gNC measured at 4 K. PL spectra measured with an integration time of 1 s for a representative gNC excited at **(a)** $\langle N \rangle = 0.06$, **(b)** $\langle N \rangle = 0.1$, **(c)** $\langle N \rangle = 0.2$, **(d)** $\langle N \rangle = 0.25$, **(e)** $\langle N \rangle = 0.35$, and **(f)** $\langle N \rangle = 0.5$, respectively. It should be noted that a very weak peak appears on the blue side of the PL spectrum measured at $\langle N \rangle = 0.5$ and is attributed to the biexciton (XX) recombination with an emission energy 32.1 meV higher than that of the main peak from single excitons.



Supplementary Figure 5 | Photon antibunching of an individual gNCC measured at 4 K. The laser excitation power corresponds to **(a)** <*N*> = 0.02, **(b)** <*N*> = 0.1, **(c)** <*N*> = 0.2, and **(d)** <*N*> = 0.4, respectively.