

Supporting Information.

S1. X-ray diffraction data

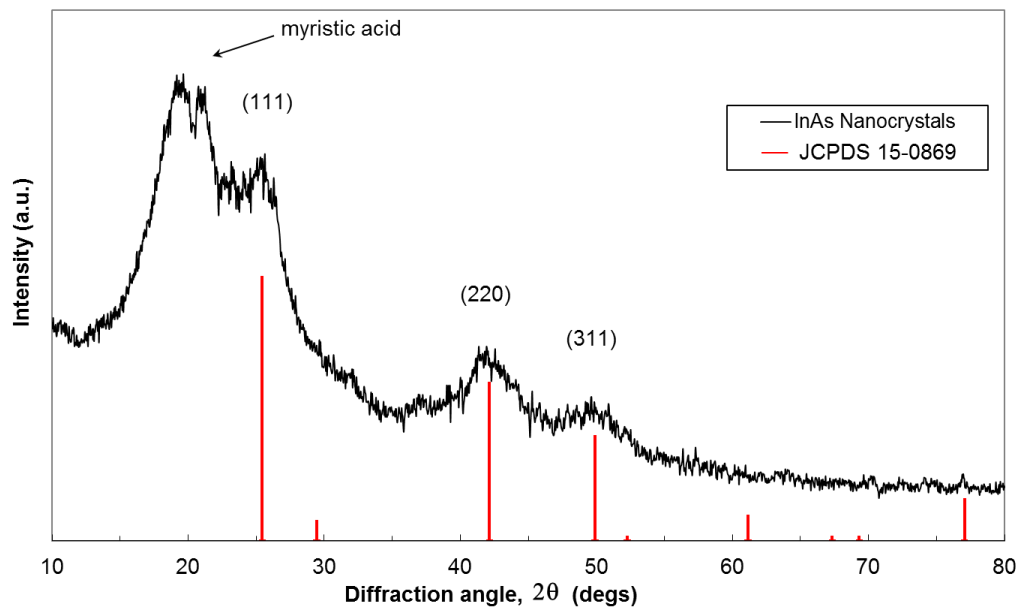


Figure S1 X-ray diffraction data for a sample of InAs cores compared to the standard data for zinc blende InAs (JCPDS card no. 15-0869). An additional peak attributed to myristic acid is also indicated.

S2 Size determination.

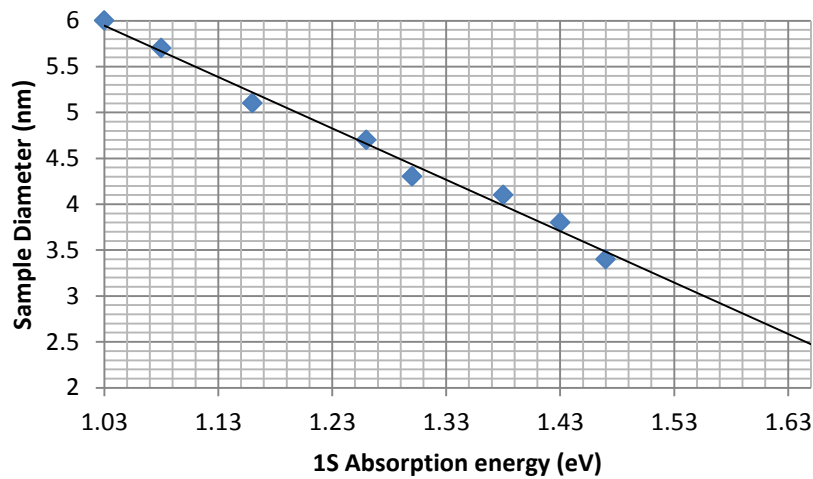


Figure S2. The linear fit to the NQD diameter vs 1S absorption peak energy data from ref. 8 which was used to calculate the diameters of the NQD used in this study.

S3. Fractional transmittance change transients

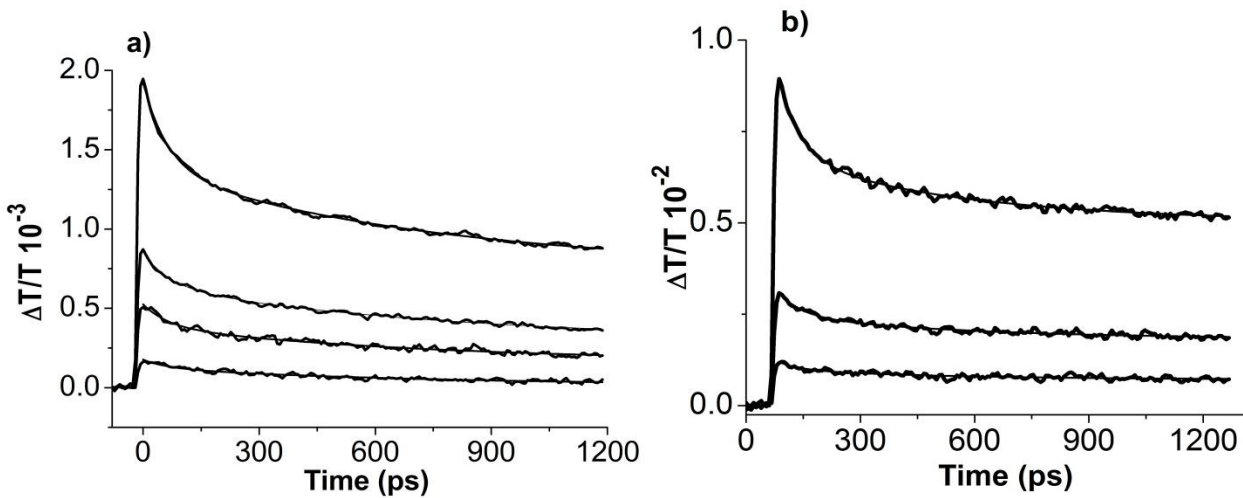


Figure S3 Fractional transmittance change, $\Delta T/T$, transients for the InAs/ZnSe NQDs with a) 2.6 nm and b) 3.5 core diameters for different pump powers between 0.5 mW and 2.5 mW. The thin black lines are bi-exponential fits to the decay from the maxima.

S4 Decay constants and fractional contributions.

The decay transients, $\frac{\Delta T(t)}{T}$, were fitted to the following expression:

$$\frac{\Delta T(t)}{T} = y_0 + A_1 \exp\left(-\frac{t}{\tau_1}\right) + A_2 \exp\left(-\frac{t}{\tau_2}\right) \tag{1}$$

where A_1 and A_2 are the amplitudes of the decay components with time constants of τ_1 and τ_2 respectively, and y_0 is an offset or plateau. For each InAs/ZnSe NQD sample, the transients obtained for different pump powers were fitted globally i.e. common values of τ_1 and τ_2 found, and hence differed only in their amplitude components and offset. The decay constants for each sample are tabulated in Table S1 below:

Table S1 Decay constants

Sample Diameter (nm)	τ_1 (ps)	τ_2 (ps)
4.4	22 ± 1	495 ± 36
3.5	58 ± 4	477 ± 38
2.6	64 ± 2	746 ± 40

The fractional contributions of each decay component and the offset, F_i ($i=0,1,2$), were calculated as

$$F_0 = \frac{y_0}{y_0+A_1+A_2}, \quad F_1 = \frac{A_1}{y_0+A_1+A_2}, \quad F_2 = \frac{A_2}{y_0+A_1+A_2} \quad (2)$$

and are given in Table S2 below. Note that we tabulate these values against peak value of $\frac{\Delta T}{T}$ rather than incident pump power because the former is proportional to absorbed power and thus also incorporates the influence of the variation in absorption cross-section and concentration between samples.

Table S2 Fractional contributions for a) 3.52 nm, b) 4.4 nm and c) 2.6 nm core diameter samples. The uncertainties shown were calculated from results of the fitting process.

a)

Peak $\Delta T/T$	F_0	F_1	F_2
1.2×10^{-3}	0.63 ± 0.04	0.15 ± 0.03	0.22 ± 0.02
3×10^{-3}	0.59 ± 0.01	0.20 ± 0.01	0.21 ± 0.01
8×10^{-3}	0.53 ± 0.01	0.26 ± 0.01	0.21 ± 0.01

b)

Peak $\Delta T/T$	F_0	F_1	F_2
4.8×10^{-4}	0.27 ± 0.09	0.48 ± 0.05	0.23 ± 0.07
1×10^{-3}	0.15 ± 0.04	0.37 ± 0.02	0.45 ± 0.03
2.1×10^{-3}	0.30 ± 0.02	0.30 ± 0.01	0.40 ± 0.02

c)

Peak $\Delta T/T$	F_0	F_1	F_2
2.7×10^{-4}	0.44 ± 0.04	0.37 ± 0.03	0.19 ± 0.03
5×10^{-4}	0.26 ± 0.01	0.46 ± 0.01	0.28 ± 0.01
9×10^{-4}	0.42 ± 0.01	0.38 ± 0.01	0.22 ± 0.01
1.9×10^{-3}	0.421 ± 0.006	0.316 ± 0.004	0.263 ± 0.004