1. Second derivative of absorbance spectrum.

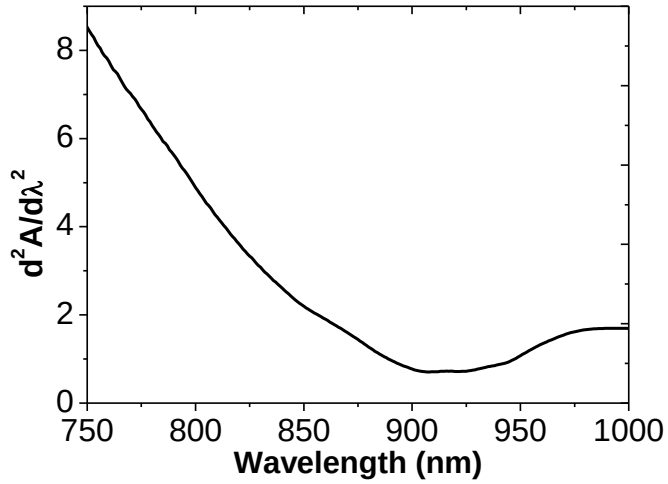

Fig. S1 *Second derivative of the absorbance spectra shown in Fig. 1.*

2. Transmittance change spectra for water (H_2O and D_2O), and mercaptopropionic acid (MPA).

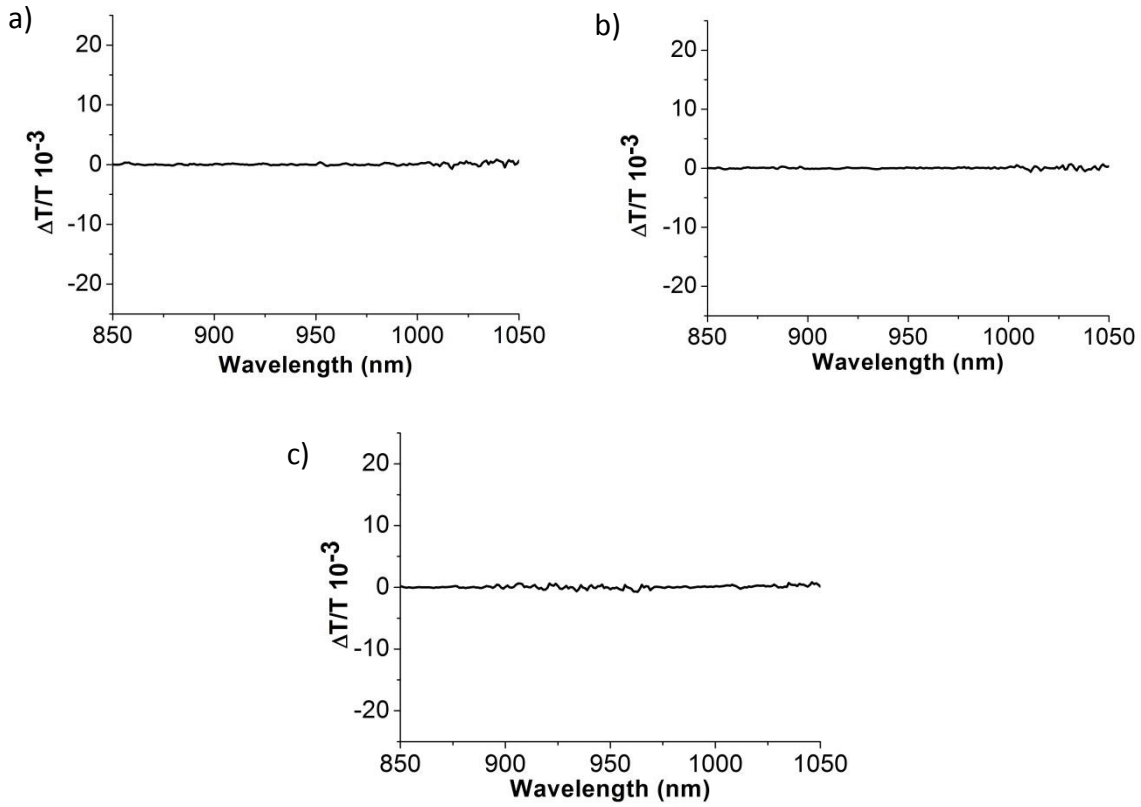

Fig. S2 Pump-induced transmittance change spectrum of a) H_2O, b) MPA and c) D_2O.

3. Pump-induced transients.

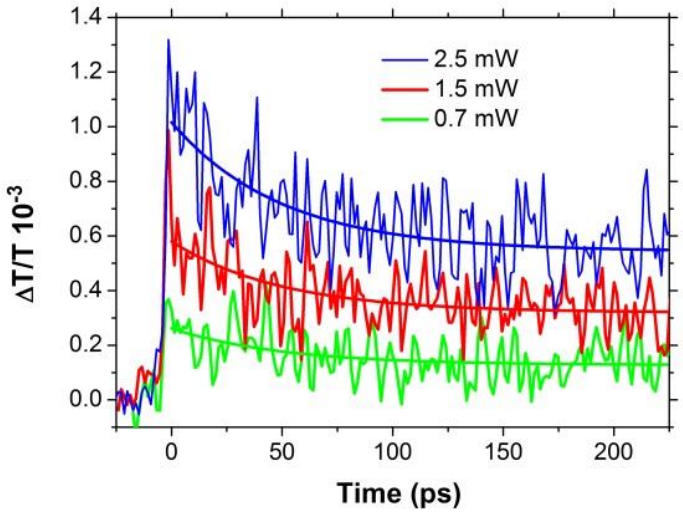

Fig S3. Transmittance transients at a probe wavelength of 900 nm for the 3.5 nm diameter QDs induced by pump beams of the powers shown in the legends and of wavelength 800 nm. The fits to the data shown are global and for a mono-exponential decay to a plateau with a time-constant of 49 ps.

4. Calculation of <N>.

The average number of photons absorbed per QD[1], $< N >= \sigma J$, where σ is the absorption cross-section of the QD at the pump wavelength and J is the fluence of the pump pulse (in units of photons per cm^2 per pulse). The absorption cross-section at the absorption edge of HgTe QDs has previously[2] been determined to be $\sim 1.5\times10^{-15}$ cm^2. The optical density of our samples was measured to be 10 times greater at 400 nm than at the absorption edge, hence we estimate $\sigma \sim 1.5\times10^{-14}$ cm^2 for a pump wavelength of 400 nm. The fluence of the 400 nm pump pulse at 1 mW power with a spot size of 0.096 cm^2 was estimated to be 4.2×10^{13} photons/cm^2/s which yields $< N > \approx 0.6$.

6. References

1. D. J. Binks, *Physical Chemistry Chemical Physics*, 2011, **13**, 12693-12704.
2. E. Lhuillier, S. Keuleyan and P. Guyot-Sionnest, *Nanotechnology*, 2012, **23**, 175705.