

A Multi-rate Kinetic Model for Spontaneous Oriented Attachment of CdS Nanorods

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Supporting information

S1

Figure S1 shows FTIR spectra of the as synthesized nanorods and nanorods after treatment in octylamine. The spectra show no evidence that the amine has bound to the nanorod, denoted by the lack of the characteristic primary amine N-H peak in $3,200 - 3,500 \text{ cm}^{-1}$ region. This distinct peak is present in the spectrum recorded for the octylamine. A previous study XPS study has shown that the amine removes the ligands from the surface of the nanorod.¹ From this, it can be deduced that the amine attaches to the ligand bound to the nanorod ends but also detaches the ligand from the nanorod.

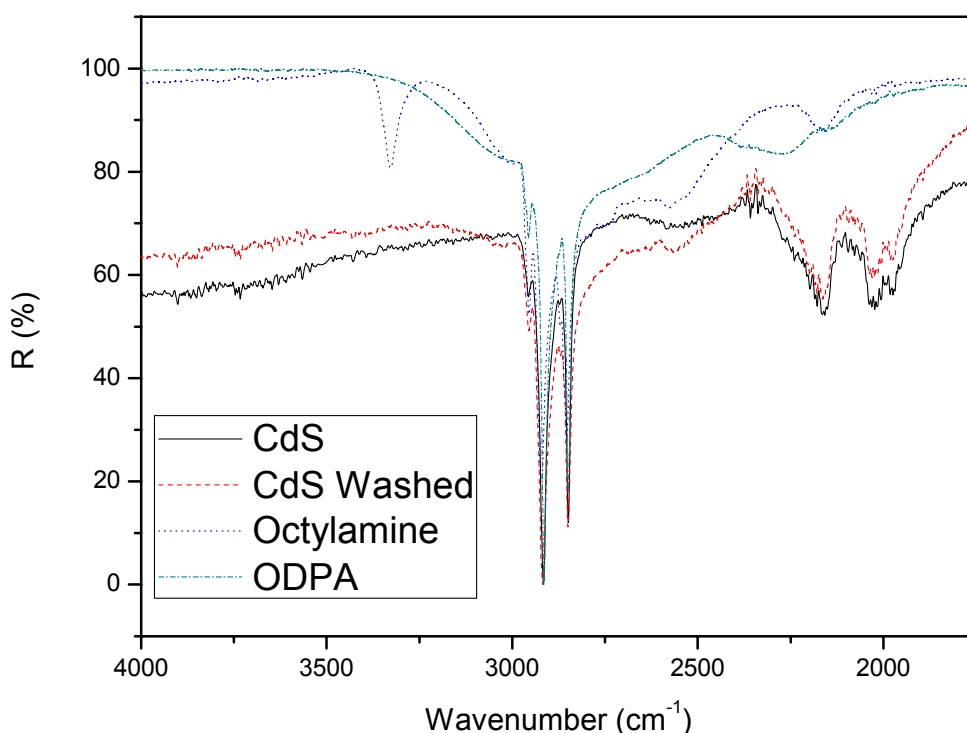


Figure S1. FTIR scans of starting rods, elongated rods, ODPA, Octylamine

S2

High-resolution TEM images [Figure S2b] of the elongated rods confirm observations from the XRD. The lattice fringing observed shows that the crystals from the two sections of the rod are epitaxial. Detailed analysis of the area where a junction between two rods occurs shows there is no obvious joint, suggesting that some ripening has taken place at the junction. Also shown are the results of injecting unelongated rods into a solution of elongated rods in the presence of amine (Figure S3). The rods do not elongate past 140 nm, but the unelongated rods elongate with each other.

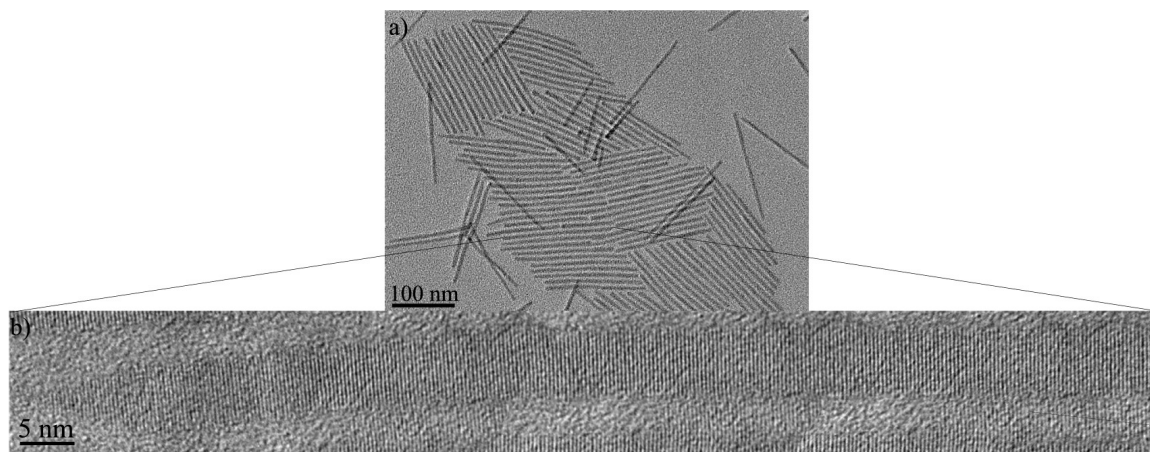


Figure S2. TEM images of a) medium resolution of the elongated rods and b) a high resolution image of elongated rods.

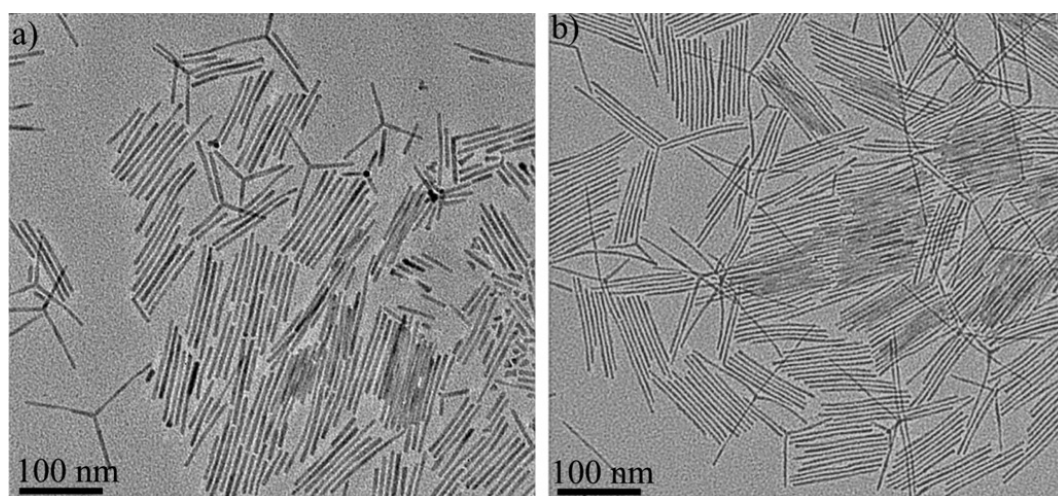


Figure S3. TEM image showing a) elongated nanorods to a maximum 140 nm and starting nanorods mixed together prior to amine wash, b) nanorods images in (a) subsequent to an amine wash showing that the previously attached nanorods do not elongate further .

S3

Figure S4 shows a typical example of the population statistics and fits for the elongating nanorods as a function of time.

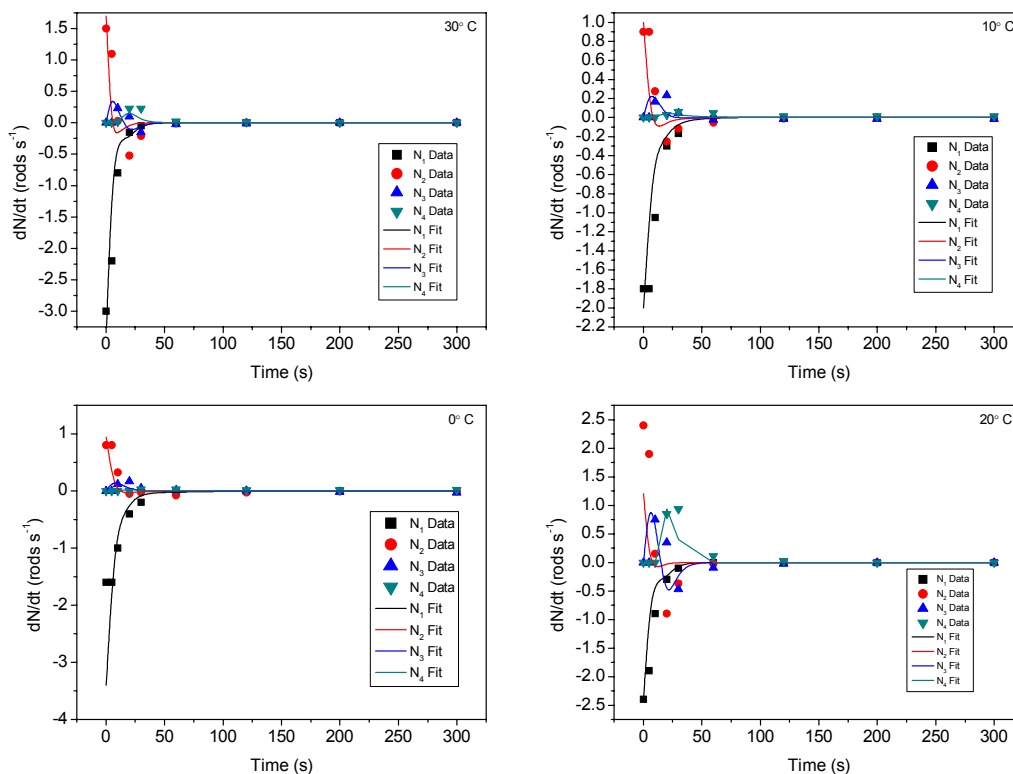


Figure S4. Typical population statistics and accompanying fits for the nanrod elongation extracted from TEM versus time.

References

- (1) O'Sullivan, C.; Gunning, R. D.; Sanyal, A.; Barrett, C. A.; Geaney, H.; Laffir, F. R.; Ahmed, S.; Ryan, K. M. *J. Am. Chem. Soc.* **2009**, *131*, 12250-12257.