Supplementary Information

The trapezoidal flow constraints are handled by a straightforward transformation of the (real) external variables [F_{CdO}, F_{Se}] to box-bounded internal variables as described, for instance, in the shadow-map algorithm of Ref. 1. The following SNOBFIT parameters, as defined in Ref. 2, were used in the control algorithm:

Snobfit Parameters (2D)

n	2	Dimensionality
Δf	0.02	fit routine assumes 2 % error in data
ncall	40	limit on the number of function calls
npoint	*n*+4	number of random start points to be generated
nreq	*n*+4	number of points to be generated in each call to SNOBFIT
p	0.3	probability of generating a point of class 4

Snobfit Parameters (3D)

n	3	Dimensionality
Δf	0.02	fit routine assumes 2 % error in data
ncall	100	limit on the number of function calls
npoint	*n*+4	number of random start points to be generated
nreq	*n*+4	number of points to be generated in each call to SNOBFIT
p	0.3	probability of generating a point of class 4

Fig. SI1 A schematic of the automated system used to synthesis the CdSe nanoparticles. Cd and Se precursor solutions are stored in two separate syringes and injected at flow-rates $\mathbf{F_{CdO}}$ and $\mathbf{F_{Se}}$ into the two inlets of a y-shaped microfluidic device. The microfluidic device rests on a hot-plate of variable temperature **T**. The reagent streams meet at the point-of-confluence, and nucleation and growth of the particles occurs as they pass along the outlet channel. The emission spectrum of the particles so produced is monitored prior to collection at a detection-zone down-stream of the chip using a 355 nm Nd:YAG laser as an excitation source and a fibre-optic coupled CCD spectrometer. The emission spectrum is then passed to a utility function that generates a single scalar "dissatisfaction coefficient" which is used to characterise the quality of the particles. The dissatisfaction coefficient is fed into a global optimisation routine that repeatedly updates $\mathbf{F_{CdO}}$, $\mathbf{F_{Se}}$ and **T** in an effort to minimize the value of the dissatisfaction coefficient and hence find the reaction conditions that yield particles with optimal characteristics.

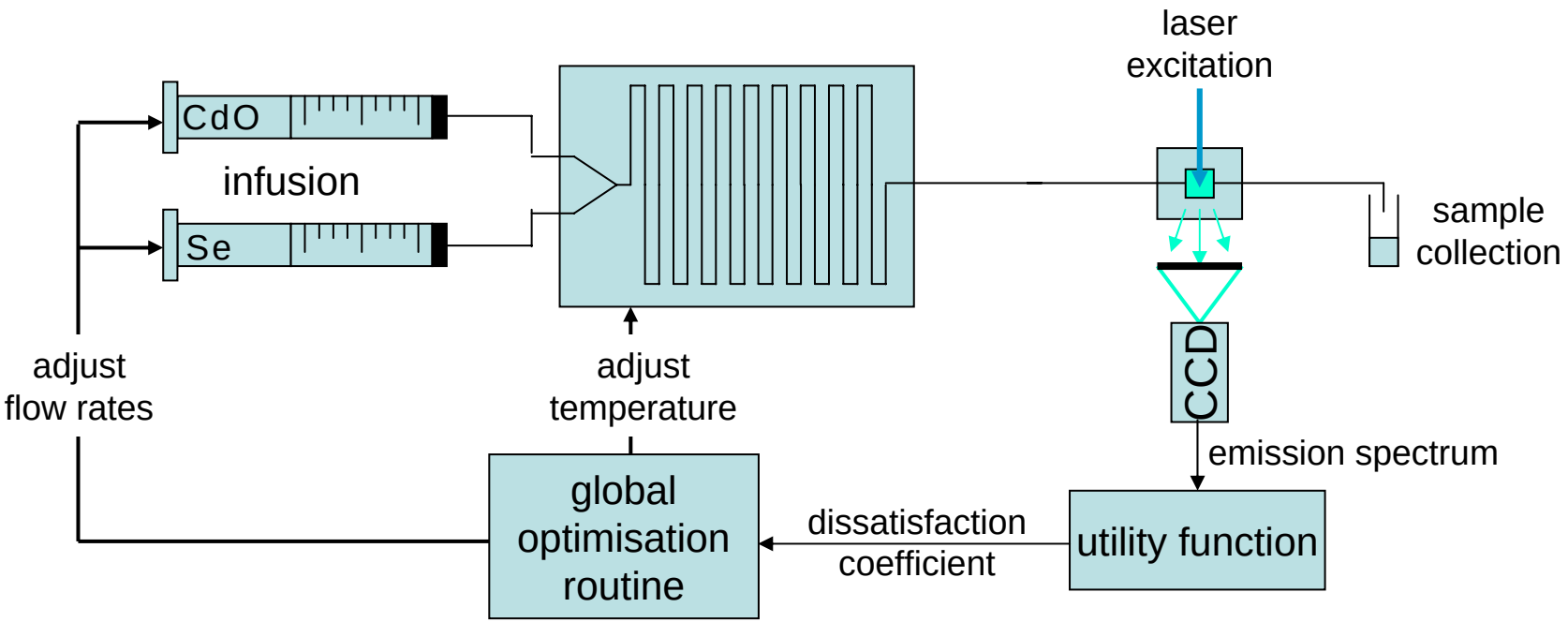
Fig. SI2 A TEM micrograph of typical CdSe nanoparticles prepared in the automated reactor of Fig. SI1. The as-produced particles were washed in a toluene/ethanol mixture prior to grid preparation. The ~5 nm particles exhibit good size uniformity and have a band-edge emission peak at 550 nm.

1. M. Tobias and T. Tiow-Seng, in *Proceedings of Eurographics Symposium on Rendering, 21-23 June 2004, Norrköping, Sweden*, 2004, pp. 153-160.

2. W. Huyer and A. Neumaier, http://www.mat.univie.ac.at/~neum/software/snobfit/.

Supplementary Information Fig. 1

schematic of automated reactor



Supplementary Information Fig. 2