

Citrate-Controlled Solution Deposition of PbSe Thin Films

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Experimental Procedure and Deposition Setup

Solution composition and order of reagents addition:

- Distilled water
- 20-63mM KOH
- 117-350mM trisodium citrate
- 9mM $\text{Pb}(\text{CH}_3\text{COO})_2 \cdot 3\text{H}_2\text{O}$
- 50 mM sodium selenosulfate, Na_2SeSO_3 .

Before the addition of sodium selenosulfate, the solutions were purged with pure N_2 gas for 60 minutes in order to reduce levels of dissolved O_2 . Single side polished undoped GaAs (100) were cleaved into 2cm*1cm wafers, cleaned with ethanol and water and passivated for 10 minutes in the thermostat. The deposition was carried on for 10/30 min at 55°C and the substrates were mounted epi-side down on a custom- designed Teflon stage at an angle of $<70^\circ$ with respect to the air–solution interface (Fig. S1S).

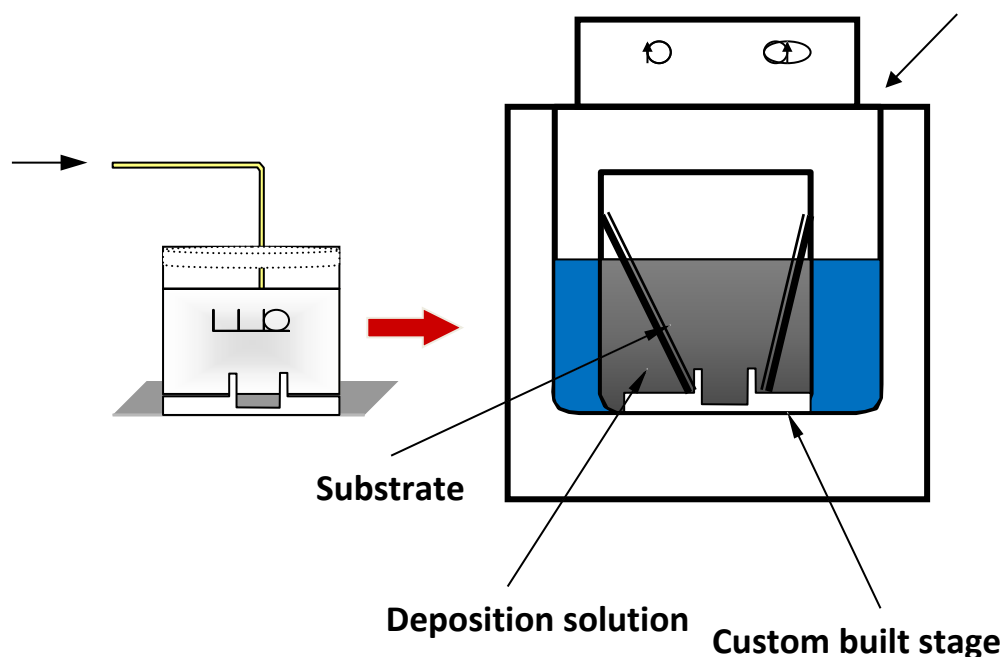


Figure S1 Schematic illustration showing the deposition setup used in this work.

Deconvolution of PL Spectra

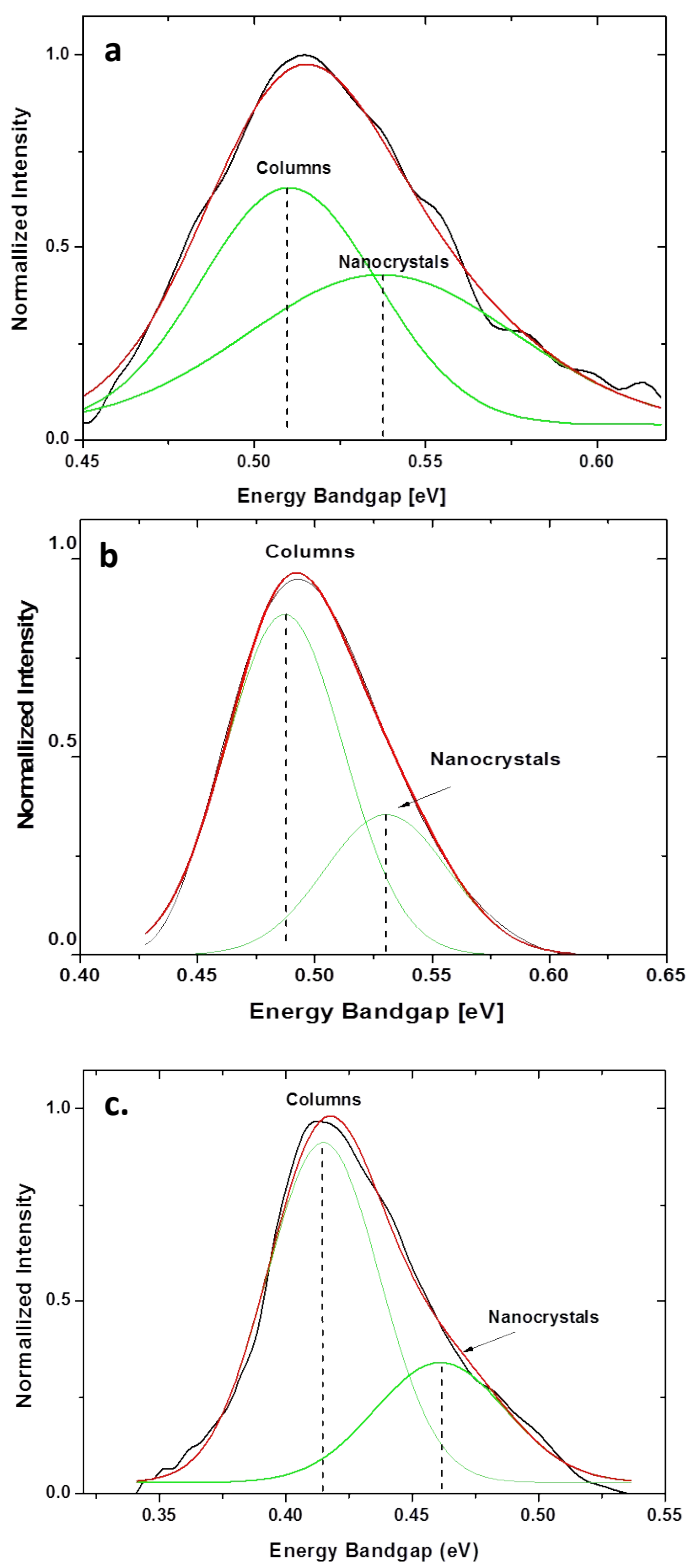


Figure S2 Deconvoluted PL spectra of direct band gap emission from PbSe films at citrate concentrations of (a) 150mM and (b) 200mM(c) 350mM. Black line is the original spectra, green lines correspond to the convoluted peaks and red line is the fit of the convolution.

Error Calculatios

Fig.1b and 2a -Thicknesses measurements were carried out from several cross-section SEM images (and from different places in the sample). Ten measurements were taken for each sample. The average was calculated and the standard deviation of these measurements is the error presented in the graphs.

Fig.5c- The column width was measured from several BF-TEM images. The calculation was done for 10 columns from different areas in the sample. The nanocrystal diameter was measured from several HR-TEM images from different places at the sample; at least 10 measurements for each sample. The average was then calculated and the standard deviation is the error seen in the graph.