



PHOTONICS RESEARCH GROUP

Navolchi Update December 2013



Physics and Chemistry of Nanostructures Group



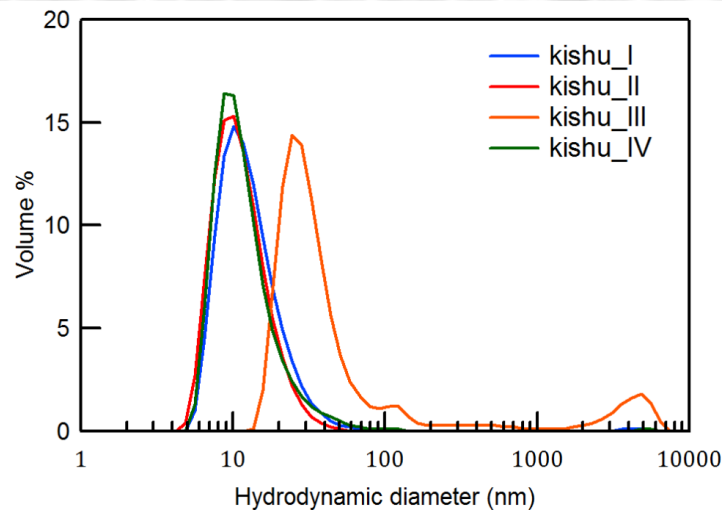
<http://www.nano.UGent.be>

Overview of activities

- HgTe quantum dots
- Absorbance of QD coated waveguides

HgTe Quantum Dots

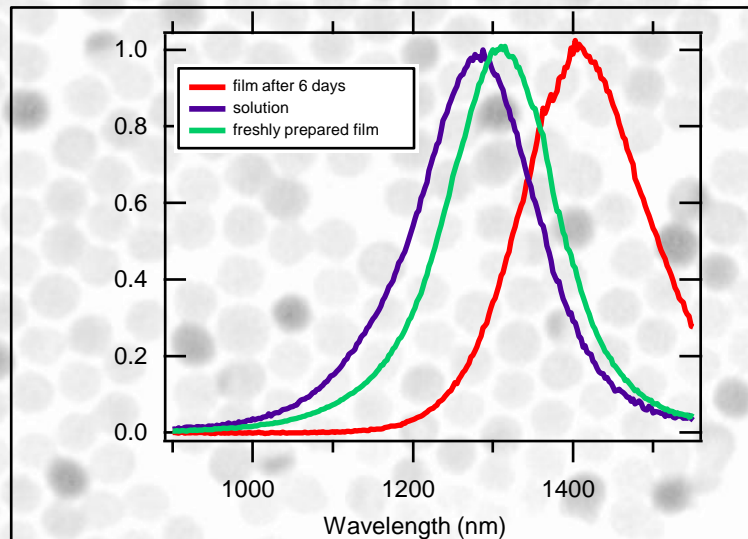
- **Aggregation/dispersion stability**
- **Problem addressed by addition of polystyrene as a stabilizing polymer to the synthesis**
 - Does not influence synthesis outcome
 - Prevents aggregation of HgTe nanocrystals



- **I,II,IV PS addition *before* the synthesis (I and II: amount of PS is varied; IV: different size)**
- **III PS addition *after* the synthesis (I to III emit at same wavelength)**

HgTe Quantum Dots

- Aggregation/dispersion stability
- Redshifted emission in dropcast films
 - Prevented using polystyrene
 - Still long term (10s of nm/week) shift observed
 - Study planned as a function of QD dilution



- Should we send a new sample to UVE?

HgTe Quantum Dots

- **Thresholdless gain**
 - **Conditions for thresholdless gain pinpointed**
 - Redshift of bandgap emission relative to absorption
 - Blueshift of excited state absorption
 - **Experimental work:**
 - New TA measurement planned on sample synthesized with polystyrene
 - Sample sent for Raman analysis (to study strong electron-phonon coupling)

Outlook

- **Finalize experimental study**
 - Confirm results on samples with long-term stability
 - Raman study to assess electron-phonon coupling strength
- **Extend analysis to HgTe QD films**