Synthesis of Cadmium based nanoplatelets and tuning of the optical properties through the thickness

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Quantum Dots technology
⇒ 3D CdSe semiconductors NPs

Monochromatic emitteurs
⇒ pure color

Color is size depending
⇒ Quantum confinement

Happy guy

⇒ Jimmy TAN, Samsung Head of consumer electronics Malaysia

⇒ Presentation of QLED TV improved technology in 2017 (first in 2013)
Quantum Dots technology ➔ 3D CdSe semiconductors NPs

Monochromatic emitteurs ➔ pure color

Color is size dependent ➔ Quantum confinement

- In a confined regime ➔ 1 dimension smaller than Bohr radius
- Modifications of state densities ➔ Optical properties
Quantum Dots technology ➔ 3D CdSe semiconductors NPs

Monochromatic emitteurs ➔ pure color

Color is size dependent ➔ Quantum confinement

- NPLs ➔ Narrower optical features
- Confinement ➔ Thickness ➔ Controlled at the atomic scale
Synthesis of Nanoplatelets

- Direct synthesis 2 to 5 ML
- Thickness controlled at the atomic scale
- Oleic Acid colloidal stability

**Cadmium precursors:**
- \( \text{CdAc}_2 \), \( \text{Cd(Myr)}_2 \), \( \text{Cd(Prop)}_2 \)...

**Chalcogenide precursors:**
- \( \text{TOPSe} \), \( \text{TOPTe} \)...

**CdSe 3 ML**
- 4 planes of \( \text{Cd} \)
- 3 planes of \( \text{Se} \)

**Zinc-blende**
- \( 100 \times 50 \times 1 \text{ nm} \)
Optical Properties of 2D NCs

- Optical properties monitored with the thickness
- Narrow optical features and no inhomogeneous broadening

Next challenge IR

- Smaller BandGap
- Thicker NPLs

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From N to N+2 monolayers NPLs starting with 3 MLs NPLs by surface energy modification !!!

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