

University of Groningen

Colloidal quantum dot field-effect transistors

Shulga, Artem Gennadiiovych

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

2019

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Shulga, A. G. (2019). *Colloidal quantum dot field-effect transistors: From electronic circuits to light emission and detection*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Propositions

Belonging to the PhD thesis

Colloidal Quantum Dot Field-Effect Transistors From Electronic Circuits to Light Emission and Detection

Artem G. Shulga

March 15th, 2019

1. By choosing appropriate ligands, capping individual PbS QDs, it is possible to control the doping and charge transport properties of the semiconducting film.
2. PbS QDs solids often show trapping-free electron transport, while holes are trapped severely by deep-level states.
3. Since the charge transport in PbS QDs is governed by phonon-assistant hopping, at low temperature the luminescence efficiency increases to the same extent that charge carrier mobility decreases.
4. QDs can be used as complementary n-type material for carbon nanotubes in highly-integrated electronic circuits, because of their orthogonal processing.
5. Patterning by lithography does not compromise optoelectronic properties of PbS QDs, which are restored after thermal annealing.
6. One of the most promising industrial applications of quantum dots is where large area photosensitive films are needed, such as for X-ray imaging.
7. PbS colloidal QDs are synthesized from earth-abundant and globally produced precursors, and the cost of them will be reduced further by the advancements in synthesis methods.
8. Anyone who has never made a mistake has never tried anything new. (Albert Einstein)