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Hybrid Organic-Inorganic Light Emitting Diodes

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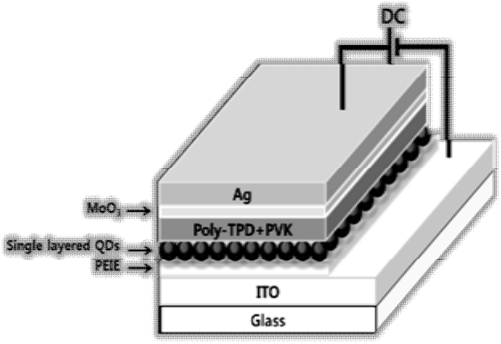
Hybrid materials containing organic components and colloidal semiconductor nanocrystals of various shapes, sizes and structures of shells are widely used for developing novel nanophotonic and optoelectronic devices. Unique optical properties of semiconductor nanocrystals, which can be effectively, controlled using quantum confinement effects, as well as the possibility to synthesize multi-layered structures of various sizes and shapes with different relative dimensions of the core and the shell draw enduring interest. At the same time, organic semiconductor materials are less expensive than their inorganic counterparts are.

A number of papers has been devoted to research and development of hybrid light emitting diodes based on a flat emitting layer of quantum dots placed between the electron and hole transporting layers. Most of these works concerned the realization of quantum dot – organic light emitting diodes (QD-OLEDs) using spherical-shaped quantum dots like Si, CdSe, CdS as well as with core-shell and core-double-shell structures like CdZnSe, CdSe/ZnS, CdSe/CdS, ZnSe/CdSe/ZnS or similar.



We expected to present the results of research of different light emitters (colloidal semiconductor nanocrystals) of different shapes: spherical, quasi-two-dimensional, tetrapodical.

As an example, we will present the results of recent research at FIAN of hybrid organic-inorganic light emitting diodes. By using the special technique, we synthesized CdSe nanoplatelets and studied their morphological and photoluminescent properties. We implemented these nanoplatelets in a hybrid organic- inorganic device: NPL-OLED emitting at maximum wavelength $\lambda = 515$ nm.

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References

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