

Nanocrystal Based Colloidal Optoelectronics

Evren Mutlugün

Electrical-Electronics Engineering, Abdullah Gül University, Kayseri/Turkey

evren.mutlugun@agu.edu.tr

Abstract

Colloidal nanocrystals are novel materials for the next generation optoelectronic devices. They offer exotic properties which are not possible using their bulk counterparts. Their high photoluminescence quantum yield, narrow spectral emission, and high extinction coefficient make them important building blocks for the colloidal optoelectronics. Amongst the important areas the nanocrystals utilized for are the solid state lighting, displays, solar energy and colloidal lasing applications. Based on their potential for energy harvesting, the market based on nano-emitters is projected to exceed 10 billion USD globally along with compound annual growth rate over 30%.

This talk will focus on our research efforts on the synthesis of colloidal nanocrystals, namely environment friendly quantum dots [1], perovskites [2], nanoplatelets, and their integration into solid state platforms. Recent results based on photoluminescence energy down-conversion as well as electroluminescence, and colloidal lasing [3, 4] will be outlined.

Keywords: quantum dots, nanoplatelets, photoluminescence, electroluminescence

Acknowledgements

EM acknowledges support from TUBITAK Project no's: 117E239, 20AG026 and TUBA GEBIP.

References

- [1] Journal of Physical Chemistry, 120,14, 7885-7892 (2016).
- [2] ACS Applied Nano Materials 2, 3, 1185-1193 (2019).
- [3] Small, 15, 8, 1804854 (2019).
- [4] Advanced Materials, 32, 1905824 (2020).