Abstract to thesis of bachelor of physics degree

Photoluminescence in Crystalline films of Semiconducting Oligomers

In organic electronics, materials combining high photoluminescence (PL) quantum efficiency together with efficient charge carrier transport are required. Some of semiconducting furan-phenylene oligomers are among a few candidates for the role of such materials.

This work is devoted to estimate photoluminescence efficiency in furan-phenylene oligomer crystals 1,4-bis(5-phenylfuran-2-yl)benzene (BPFB). For PL measurements, the integrating sphere method was applied.

In this work, PL spectra of BPFB crystals grown both from vapor and solution were measured; the spectra were found to be practically coincident. The PL external quantum yield (EQY) reaching extremely high values (98 – 100 %) for solution-grown crystals was obtained, whereas for vapor-grown ones the value was two times lower (40 – 60 %). It was revealed that BPFB crystal growth method (from vapor/solution) strongly affects PL efficiency of obtaining crystals. The impact of reabsorption effect on PL EQY of the crystals with high PL efficiency was also examined and discussed.

The main result in this work is the demonstration of the 100-% PL QY value (within the error of 5 %) in BPFB solution-grown crystals making them to be desirable materials for constructing efficient light-emitting devices of organic electronics.

Student: Konstantinov Vladislav Georgievich

Supervisor: Professor, Dr. Paraschuk D.Yu.