Development and Characterization of OPD - OLED Hybrid Device System

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Organic semiconductors attract the attention thanks to the supply of more material varieties compared to inorganic semiconductors and their ability for being turned into thin film. In our researches; we aimed to produce new generation hybrid OPD – OLED cells with low production costs by using the polyfluorene – derivative organic semiconductor material PFE and ZnO nanoparticles in active layer, intending to develop a hybrid device system which could function as OLED and OPD under feedforward and feedback respectively. Firstly, the ground and excited state behaviors and surface morphologies of the materials, which will be used in experiments, were examined in our project. Our system was produced by the coating of the materials, which form the structure of the device, on substrate in order after the determination of the appropriate volumetric ratio of PFE and ZnO materials. And then, the electrical characterizations were executed and interpreted. The developed device emitted dirty blue – white light under feedforward and exhibited photoresponsivity values that could compete with the electrical characteristics of devices reported in literature, under UV-A light. Our project study, which is about developing a hybrid OLED – OPD device system, has bidirectional hybrid characteristics in terms of both organic – inorganic materials that are used in active layer and being able to run under feedforward and feedback. The absence of any product, which shows both of these two properties, reveals the originality of our project.

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