Nanostructured surfaces

Nanostructured Oriented Layers of Organic Molecules for Multicolor Emitting Devices

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Organic luminescent materials attract considerable interest due to prospective of use in the design of small-sized RGB emitting elements. In this work, oriented thin layers films of blue emitting and yellow emitting organic molecules (1-pentyl-2/,3/-difluoro-3///-methyl-4////-octyl-p-quinquephenyl and 9,10-Bis (4-pentylphenylethynyl)antracene) were deposited on optical glass with SnO_2 coating. Spatial orientation of the molecules was controlled in the deposition process by applying electric field in two different directions: normal to substrate surface and parallel to substrate surface.

Obtained nanostructured films were thoroughly characterized by means of different techniques. Bruker MultiMode 8 atomic force microscope was used to acquire height images of the films under ambient environment. These images directly confirm predominant orientation of molecules in layers. Optical measurements (photoluminescence spectroscopy and optical absorption spectroscopy) indicated that there is a significant difference in emission intensity and absorption peaks maxima between organic layers with perpendicular and parallel spatial predominant orientation. Using the measured spectra and our earlier results of optical measurements on randomly oriented layers we have calculated the polarization degree for “blue” and “yellow” molecules.

The ideas of using oriented layers exhibiting luminescence in visible range for organic LED designs will be discussed.

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