Enhancement of the Molecular Orientation of TPBi in Co-evaporated Films of UGH-2 Host Molecules

H.D.C.N. Gunawardana[1*], K. Osada[2], K.R. Koswattage[3], and Y. Noguchi[2]

[1]*Faculty of Graduate Studies, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka*
[2]*School of Science & Technology, Meiji University, Kanagawa, Japan*
[3]*Faculty of Technology, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka*
[*]*niroshangunawardane@gmail.com*

In this study, we investigated the formation of spontaneous orientation polarization (SOP) on co-evaporated mixed films of polar and non-polar molecules. The SOP is generally observed in evaporated films of organic light-emitting diode devices and, performance of the devices has changed effect on the SOP. However, the formation mechanism for the SOP remains to be clarified. Here, we describe characteristics of the surface potential and the enhancement factor as a function molecular composition ratio of polar (1,3,5-Benzinetriyl)-tris(1-phenyl-1-H-benzimidazole) (TPBi) with nonpolar molecule of 1,4-Bis(triphenylsilyl) (UGH-2) and 4,4′-Bis(9-carbazolyl)-1,1′-biphenyl (CBP) under the ultra-high vacuum (UHV) conditions. The evaporated films were characterized via Kelvin probe (KP) measurement technique in order to measure the surface potential. Further, the surface morphology of the films was observed via atomic force microscopy. We have found that the degree of molecular orientation of TPBi increased on UGH-2 and CBP hosts, although it was small directional, scores are considered in UGH-2 hosts due to van der Waals's interaction. The strong anisotropic trend of TPBi can be attributed to the disk- like molecular shape.

Keywords: *Permanent dipole moment, Surface potential, Orientation polarization, Organic light-emitting diodes*