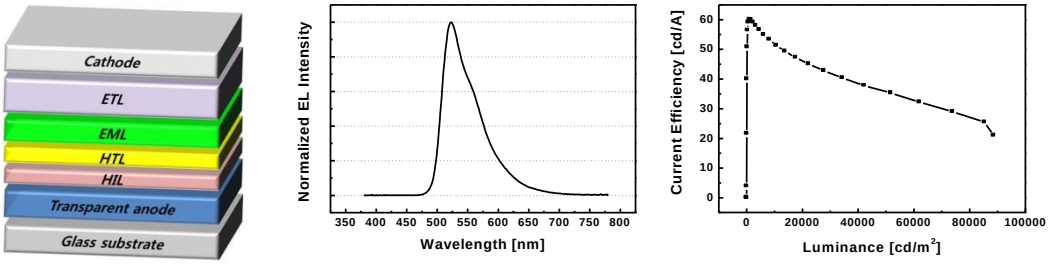
Preparation and Characterization of the New Hole-transporting Material for Vacuum-deposited Green Phosphorescent OLEDs.

Hyejin Na[a,b], Hyun Han[a], Sunghyun Son[c], Changsik Song[b], Byung Jun Jung[c] and Jaemin Lee*[a]
[a] *Advanced Materials Division, Korea Research Institute of Chemical Technology, Daejeon, 305-600, Republic of Korea*
[b] *Department of chemistry, SungKyunKwan University(SKKU), 2066, Seobu-Ro, Jangan-gu, Suwon-si, Gyeong gi-do, Republic of Korea*
[c] *Department of Materials Science and Engineering, The University of Seoul, Seoul 130-743, Republic of Korea*

In the research of organic electronics materials, organic light-emitting diode (OLED) is one of the example of actual commercialization, which enables the realization of ultra-thin and flexible displays. To improve the device performance, each of the functional layers in OLEDs, e.g., hole-transporting layers (HTLs), emitting layers (EMLs), and electron-transporting layers (ETLs), should be carefully combined, and of course, the characteristics of each of the layer can be easily tuned by selecting proper materials.[1] Among various layers and materials in OLEDs, HTLs are important to reduce the driving voltage, and to increase the efficiency of the device. However, from the viewpoint of the chemical structures, most of the hole-transporting materials (HTMs) in current OLEDs are limited to arylamine derivatives[2], and new innovative design of HTMs is still so necessary. In this work, we designed and synthesized a new kind of HTM for vacuum-deposited green phosphorescent OLEDs. The chemical structures of the new material were confirmed by ^{1}H and ^{13}C NMR spectroscopy, and high-resolution mass spectroscopy. The new material was thermally stable up to more than 300 ^{o}C which was confirmed by TGA and DSC. The optical properties of the new material were characterized by UV-vis. and PL spectroscopy, and the triplet energy level of the new material was as high as 2.6 eV, which is high enough for green phosphorescence. The OLED device using the new HTM outperformed the control devices using NPB or TAPC as HTMs, and it showed a maximum current efficiency higher than 60 cd/A. Detailed characterization and OLED device results will be discussed in the presentation.

We would like to acknowledge the financial support from the R&D Convergence Program of NST (National Research Council of Science & Technology) of Republic of Korea (Younghapsilyonghwa-13-10-KITECH).



[1] L. Xiao, Z. Chen, B. Qu, J. Luo, S. Kong, Q. Gong and J. Kido., Adv. Mater., 2011, **23**, 926.
[2] Y. Shirota and H. Kageyama, Chem. Rev., 2007, **107**, 953.