Comment on the Communication “Highly Efficient White Organic Electroluminescence from a Double-Layer Device Based on a Boron Hydroxyphenylpyridine Complex” by Wang et al.

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Recently, Liu et al.[1] developed a new luminescent material, 1,6-bis(2-hydroxy-5-methylphenyl)pyridine, ((mdppy)BF) and investigated its electroluminescent (EL) properties. They claimed that a highly efficient “white-light” device could be produced based on molecular structures incorporating ITO/NPB/(mdppy)BF/LiF/Al configurations (ITO = indium – tin oxide; NPB = *N*,*N*′-bis(α-naphthyl)-*N*,*N*′-diphenyl-1,1′-biphenyl-4,4′-diamine). Knowing that the photoluminescence (PL) spectra of solid film for individual (mdppy)BF and NPB were maximized at 445 and 450 nm, respectively, they further attempted to rationalize the results of white-light EL based on the exciplex formation at the interface between NPB and (mdppy)BF. Support for this viewpoint was rendered by the PL spectra of the single-layer co-deposited NPB/(mdppy)BF film in which the emission is qualitatively similar to the EL spectrum at a high ratio of the interface versus the bulk of the two materials.

While the results and interpretation are sound, the EL spectrum illustrated in Figure 4, which is the main frame of ref. [1], deserves more careful examination. Through the course of studies on the weak chemiluminescence and/or electroluminescence we have gained a lot of experience in dealing with the interference of stray, dim light, particularly when the sample emission consists of broad spectral features. When we compared Figure 4 of the article with the spectrum acquired from dim room light (fluorescent lamp) a striking resemblance was apparent. Four major Hg lines (Figure 1 b; 405, 437, 546, and 577 nm) exactly overlap with the peaks in the EL spectrum shown in Figure 4 of ref. [1] (Figure 1 a). The ratios for the respective peaks of Figures 1 a and b are slightly different. This is possibly a result of the different spectral response of the charge coupled detector (CCD, Princeton Instrument, Model 576G/1) and the PR650 spectrometer used in ref. [1].

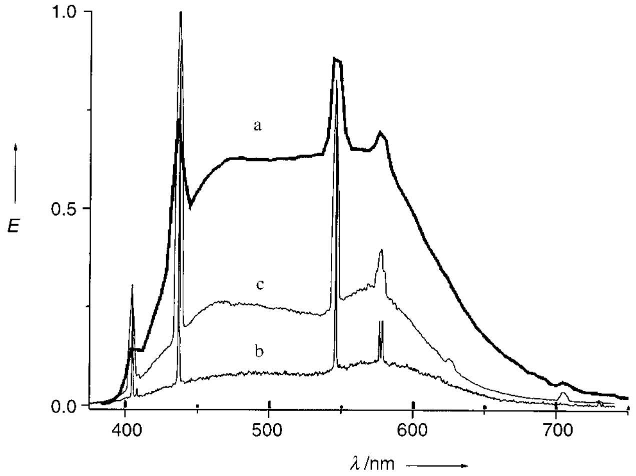

Figure 1. a) The EL spectra taken from Figure 4 of ref. [1]; b) spectrum of the dim room light from a Hg fluorescence lamp; c) similar experimental conditions as in b, except that the slit was adjusted to achieve similar spectral resolution as in a.

The much more sensitive CCD system led to the use of a smaller slit and hence increased the spectral resolution (note the doublet feature on the 577-nm line). Figure 1 c demonstrated the low-resolution spectrum of room light in which the slit had been adjusted so that the bandwidth of the spectral line was similar to that shown in ref. [1]. Again, the match of four spectral lines in Figure 1 a and c is apparent.

The exact match in wavelength for four Hg atomic lines led us to conclude that there existed certain interference from the stray light in the EL spectrum shown in Figure 4 of ref. [1]. Furthermore, there is a lack of photophysical basis to anticipate sharp spectral lines in an EL device consisting of organic dyes in the solid film.

Certainly, without performing a similar EL experiment as that in ref. [1], we cannot and do not intend to make any conclusions regarding the capability of the white-light generation based on the aforementioned device. However, the significance of ref. [1] is mainly in the white light generation using a very simple organic array which is of current importance in developing a light-emitting device. We thus feel this comment is appropriate and timely.

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[1] Y. Liu, J. Guo, H. Zhang, Y. Wang, *Angew. Chem.* **2002**, *114*, 190 – 192; *Angew. Chem. Int. Ed.* **2002**, *41*, 182 – 184.