## 【심포지움-EL 02】

# Effect of Fine Tuning of a tris-Orthometalated Ir(III) Complex on Electrophosphorescent Devices

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We have synthesized, characterized and investigated the optical, and electroluminescence characteristics of a new green emitting Ir(III) complex, *fac*-tris(3-methyl-2-phenylpyridinato-*N,C*2)Ir(III), *fac*-[Ir(mpp)3], with the ligand, 3-methyl-2-phenylpyridine (Hmpp, mpp is the anion of 3-methyl-2-phenylpyridine). The methyl substituent, ortho to the C-C bond linking the pyridyl and phenyl ring, is used as a means for fine-tuning of the ligand so as to bring a significant difference in the properties of the complex. The complex shows higher energy HOMO and MLCT states and a bathochromic shift in both the MLCT absorption and PL spectra compared to *fac*-[Ir(ppy)3]. We demonstrate that this fine-tuning can lead to the fabrication of highly efficient green OLEDs by doping the complex in a hole transporting material. The maximum external quantum efficiency from a 8% *fac*-[Ir(mpp)3] doped CBP (4,4-*N,N*-dicarbazole-biphenyl) device was 10% (power efficiency was 16.5 lm/w). The OLED with 2% *fac*-[Ir(mpp)3] doped TAZ (3-(4-Biphenylyl)-4-phenyl-5-tert-phenyl-1,2,4-triazole) as the emissive layer furnished 5.3% quantum efficiency. Quantum efficiency is observed to decrease as the doping concentration increases in TAZ with the emission from the hole transporting material -NPD (4,4-bis[*N*-(1-napthyl)-*N*-phenyl-amino]biphenyl), contrary to the observation of OLEDs comprising *fac*-[Ir(ppy)3] doped TAZ as the emissive layer. The higher quantum yields are attributed to the better hole transporting properties of *fac*-[Ir(mpp)3]. The different electroluminescence behavior of *fac*-[Ir(mpp)3] from that of *fac*-[Ir(ppy)3] is a direct manifestation of the effect of methyl substitution in the pyridine ring of 2-phenylpyridine.