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Achieving High Efficiency OLEDs for Displays and Solid State Lighting

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Recent results suggest that organic light emitting devices can provide the very highest efficiencies of any other active display medium, with the exception of those media using ambient light to provide contrast. In this talk, I will consider methods and recent advances in achieving very high efficiency OLEDs for displays and white light generation. In particular, I will consider the physics and technology of employing phosphors in both small molecular weight and polymer organic systems for obtaining the highest possible efficiencies[1,2]. Further, outcoupling schemes for maximizing high external efficiencies will be discussed. For solid state lighting applications, methods and challenges for generating white light via electrophosphorescence are considered. In particular, very simple and high efficiency sources can be obtained using a single dopant based on planar Pt complexes that forms a spectrally broad emitting states. Using this approach, we have a unique opportunity to use OLEDs not only for the next generation of displays, but also for very efficient, environmentally friendly room illumination applications.

[1]B. D'Andrade and S. R. Forrest, Adv. Mat. **16**, 1585 (2004).
[2]M. Segal, M. A. Baldo, R. J. Holmes and S. R. Forrest, Phys. Rev. B **68**, 075211 (2003).