



第276回 OPERA研究交流セミナー

第267回 ISIT有機光エレクトロニクス研究特別室セミナー

第334回 未来化学創造センターセミナー



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Deep Blue Phosphorescent OLEDs: Can Organics Live Long Enough at High Energies to be Useful?

Prof. Stephen R. Forrest

University of Michigan

Perhaps the single most important problem confronting the development of OLED displays and lighting today is how to achieve sufficiently long triplet-controlled emission device lifetime to prevent rapid color change during operation, while achieving 100% internal emission efficiency. It has been shown¹ that bimolecular (e.g. triplet-polaron, triplet-triplet) annihilation provides a source of energy sufficient to destroy the blue triplet chromophore (whether a phosphor or a TADF molecule) or its host. Many materials, structures and strategies to extend blue emission lifetime based on this understanding have been demonstrated. Unfortunately, a fully satisfactory solution has not been shown where blue triplet emitter lifetime is sufficient to meet the standards of high performance displays, although white OLED illumination sources now have adequate lifetime to meet industry standards. In this talk I will discuss progress in extending blue phosphorescent OLED (PHOLED), phosphor sensitized fluorescence, and TADF lifetimes using a combination of plasmons and polaritons.^{2,3} In particular, I will focus on the relationship between radiative state lifetime, exciton density, and the longevity of PHOLEDs. I will discuss routes resulting in increasing the deep blue phosphorescent longevity by at least 100X via emitter design, polaritons, and optical cavity engineering, leading to blue lifetimes as long as green PHOLEDs. Lessons learned can be applied to all organic electronics that operate at high energies and energy densities.

主催: 九州大学 最先端有機光エレクトロニクス研究センター

: 財団法人九州先端科学技術研究所 (ISIT)

共催: 九州大学 未来化学創造センター