Organic White Light-Emitting Dyes: Small Molecular Architectures for Panchromatic Emission

Michael D. Heagy, Department of Chemistry, New Mexico Institute of Mining & Technology

Organic light emitting diodes (OLEDs) have gained attention as one of the most appealing solutions for low energy consumption in solid-state lighting. To date organic white light-emitting devices (WOLEDs) are obtained by combining the emission from red, green and blue or sky-blue and orange emitters. The combination of these emitters can be achieved by the deposition of multiple layers on top of each other, by mixing them into one single emitting layer, combinations of the two techniques, and by combining them into polymeric structures. These approaches require more complex device architectures and production processes compared to single-emitter based OLEDs, which has so far greatly hindered their market entry. Therefore, development of a white light-emitting single molecule is very much desired. According to our photophysical model from symmetrically related 1,8-NI's, a synthesis that generates various 5- and 6-substituted 2,3-naphthalic anhydrides bearing electron-withdrawing substituents is critical for new WOLED design.