Intramolecullar and intermolecular charge-transfer approaches for thermally activated delayed fluorescence

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Organic thermally activated delayed fluorescence (TADF) emitters were demonstrated to be promising candidates for the application in organic light emitting diodes (OLEDs) as they are rare-earth-metal-free dyes which can theoretically realize 100% internal quantum efficiency of OLEDs [1]. TADF emitter-based light-emitting layers confirming both high photoluminescence quantum yields and small singlet-triplet energy splitting of used emitters have to be developed for fabrication of efficient OLEDs.
Recently developed in our group donor-acceptor compounds will be presented as TADF emitters for highly efficient OLEDs. Three important effects concerning the solid-state photophysics of TADF emitters will be discussed, providing insight on the following new- or opposed-to-established results: (i) the TADF efficiency of new derivative of acridan in guest-host mixtures is insensitive to the host polarity; (ii) aggregation and (iii) annealing processes respectively reduce and increase the dihedral angle between isophthalonitrile ring and acridan moiety, with strong impacts on the photoluminescence parameters. In addition, recently developed in our group donor-acceptor solid mixtures will be presented as TADF exciplex-based emitters for highly efficient OLEDs. Unusual phenomenon i.e. high-energy and low-energy exciplex emission for the same donor-acceptor exciplex-forming system (dual nature of exciplexes) will be discussed.

References

1. Uoyama, H.; Goushi, K.; Shizu, K.; Nomura, H.; Adachi, C. *Nature*, 2012, *492*, 234–238.