

RTP vs TADF in a purely-organic, amphiphilic, water-soluble emitter

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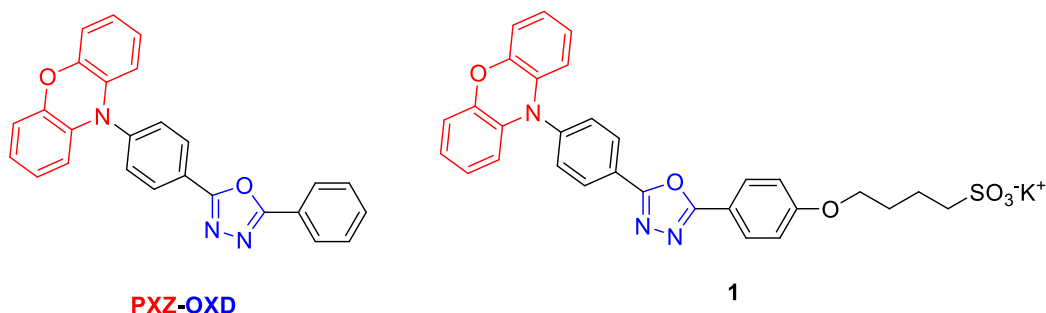
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The development of OLEDs has seen several improvements since their first introduction in 1987.^[1] The first milestone of this technology was reached in 1998 by Thompson, Forrest, and their co-workers^[2] by employing phosphorescent coordination complexes with heavy transition metals (e.g., iridium or platinum) in the emissive layer, leading to an internal quantum efficiency (IQE) close to 100%. However, OLEDs still have several issues, such as the natural low abundance of the employed metals, high fabrication cost, and the low stability of blue emitters. Two new types of purely organic emitters based either on thermally activated delayed fluorescence (TADF), or room temperature phosphorescence (RTP) can solve these issues. Usually, the structural requirements for RTP and TADF emitters are similar, with a donor (D)- acceptor (A) structure and employing heteroatoms with free electron pairs. Moreover, through minor structural modifications, the TADF / RTP nature of the emission can be interchanged from due to the modification of the HOMO-LUMO distribution.^[3,4]

We report here a purely-organic, water-soluble RTP emitter **1**, derived from the previously reported **PXZ-OXD** TADF emitter.^[5] Due to structural modifications, the emission stems purely from a triplet state, and the formation of H-aggregates in water protect the triplet state even in the presence of oxygen.



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