Synthesis of highly luminescent organic nanorods by oxidation of para-substituted anilines and their application to red-color-converting layers

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Oxidizing aniline provides a variety of useful products with numerous nanostructures. Here, a novel luminescent organic nanorod (ON) is synthesized through one-step oxidative polymerization of para-substituted anilines. Our ONs exhibit highly crystalline rod-like structures without any shape-guiding surfactants due to the ortho-coupling polymerization of aniline and π-π interaction between the phenazine-like structures. Using photoluminescence spectroscopy, absorption spectroscopy, time-correlated single photon counting, and DFT calculation, it is revealed that ONs are composed of the phenazine-like structures, resulting in for the bright, photo-stable red-color luminescence of ONs. To explore the potential of ONs as a photoactive material, color-converting layers using ONs are successfully demonstrated. This study could provide a new strategy for the synthesis of luminescent organic nanomaterials and could demonstrate the potential of ONs in optoelectronic applications with advantages of simple synthesis, one-dimensional structures, and excellent optical properties. This work was supported by the KIST Institutional Program (Project No. 2E28200-18-018).