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A Wide-Energy-Gap Naphthalene-Based Liquid Organic Semiconductor Host for Liquid Deep-Blue Organic Light-Emitting Diodes

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Abstract

We developed a novel naphthalene derivative to function as a wide-energy-gap liquid organic semiconductor (LOS) host material for the limited range of liquid deep-blue light-emitting materials that have been developed to date. The naphthalene derivative 1-naphthaleneacetic acid 2-ethylhexyl ester (NLQ), which shows a low viscosity of 20 mPa·s at 25 °C, was synthesized as a LOS by introducing an ethylhexyl group into naphthalene. We doped 9,10-diphenylanthracene (DPA) into NLQ as a guest deep-blue dye. The highest occupied molecular orbital (HOMO) energy level of NLQ was estimated to be -6.40 eV from photoelectron spectroscopy measurements in air. The energy gap of NLQ was estimated to be 4.08 eV from its absorption spectrum, indicating that NLQ has the widest energy gap of any such host material to date. The

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