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LETTERS TO THE EDITOR

Synthesis of Europium(III) Complex with Phthalocyanine and 8-Hydroxyquinoline

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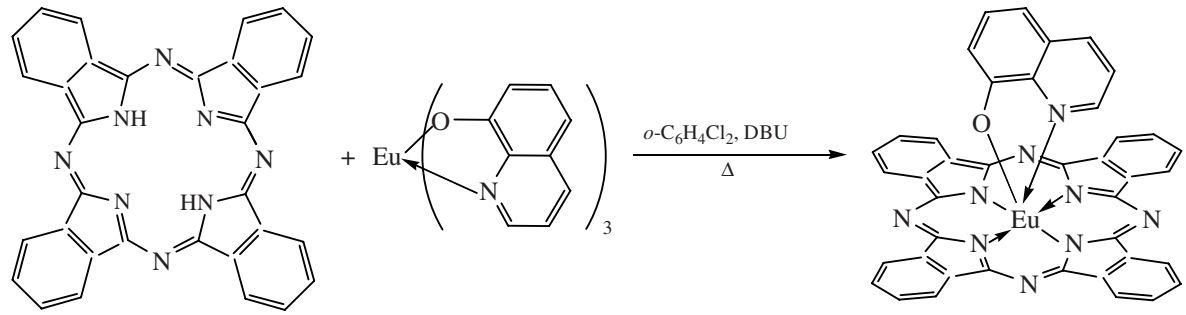
Phthalocyanine metal complexes are classed with the best organic semiconductors [1]. Their use in molecular optoelectronics is determined by the possibility for combining various physicochemical and photovoltaic properties. We have synthesized previously unknown europium(III) complex with phthalocyanine and hydroxyquinoline ligands. We anticipated that a combination in a single molecule of a phthalocyanine ring possessing hole conductivity with emitting properties of europium atom and electron-transfer ability of hydroxyquinoline fragment will endow the complex with polyfunctionality so that it could used as material for organic light-emitting diodes.



I **II** **III**

Among a wide variety of synthetic methods for the preparation of mixed-ligand coordination compounds [2] we selected direct reaction of phthalocyanine (**I**) with tris(quinolin-8-olato)europium(III) (**II**) in the presence of 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU) as organic base. The reaction of the above initial compounds in boiling *o*-dichlorobenzene gave complex **III** which was isolated as individual substance. Its structure was confirmed by the IR, UV, and ^{1}H NMR spectra and elemental analysis.

Tris(quinolin-8-olato)europium(III) (**II**) was synthesized according to the procedure described in [3].

(Quinolin-8-olato)(phthalocyaninato)europium(III) (III). A mixture of 0.2 g of phthalocyanine (**I**), 0.5 g of tris(quinolin-8-olato)europium(III) (**II**), and 1 ml DBU in 10 ml of *o*-dichlorobenzene was heated for 3 h under reflux. The mixture was cooled and poured into 100 ml of hexane, and the precipitate was filtered off and purified from impurities by Soxhlet extraction.

Yield 0.25 g (89%). IR spectrum, ν, cm^{-1}: 3055 (C–H); 1736, 1614, 1571, 1545 ($C=C_{arom}$); 1497 (–N=); 1463, 1370 (isoindole); 1319 (pyrrole); 1276 (δC=C, quinoline); 1186 (δ, isoindole); 1160 (δ, pyrrole); 1108, 1093 (δC–H, in-plane); 1059 (δC–H, in-plane + isoindole); 873 (δ, isoindole, –N=); 823 (δEu–N); 730 (δC–H, out-of-plane). UV spectrum, λ_{max}, nm (relative intensity): 679 (*Q* band, 1.0), 614 (vibrational satellite, 0.20), 335 (*B* band, 0.76), 318 (π–π, quinoline, 0.73). ^{1}H NMR spectrum, δ, ppm: 7.2 (1H), 7.46 (1H), 7.63 (1H), 7.81 (1H), 8.03 (1H), 9.03 (1H) (quinoline); 8.41 (8H), 9.27 (8H) (Pc). Found, %: C 61.17; H 3.11; N 15.87. $C_{41}H_{22}EuN_9O$. Calculated, %: C 60.90; H 2.74; N 15.59.

The IR spectrum was recorded in KBr on a Shimadzu FTIR-8400S spectrophotometer (spectral range 400–4000 cm^{-1}). The electronic absorption spectrum was measured from a solution in chloroform ($c = 5\times10^{-5}$ M) on an SF-2000 spectrophotometer. The ^{1}H NMR spectrum was obtained on a Bruker AC-400 instrument at 400 MHz using DMSO-d_6 as solvent and tetramethylsilane as internal reference. The elemental composition was determined on a 932 LECO CHNS (O) analyzer.

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