The quenching of the Yb (III) porphyrazine complexes and heterocyclic ligands by C_{60} in solutions

Lopatin M.A.*, Klapshina L.G., Grigoryev I.S., Semenov V.V., Lermontova S.A., Domrachev G.A.

G.A. Razuvaev Institute of Organometallic Chemistry, Russian Academy of Sciences, 603950, Nizhny Novgorod, Russia
**e-mail: lopatin@iomc.ras.ru*

The interaction of the Yb(III)tetra-aryl-tetra-cyano-porphyrazine complexes (Aryl=C_6H_5(I), C_6H_4F(II), C_6F_5(III), $C_{10}H_7$(IV)) with C_{60} had been investigated. Complex (I) is readily soluble in organics. It is well compatible with a variety of polymeric matrices giving doped polymeric glasses, films and solutions which are highly luminescent (φ = 13%) in the biologically relevant optical window covering the visible and near infrared range.

We investigated complexes (I-IV) luminescent spectra ($\lambda_{excitation}$= 300 nm) in acetonitrile solutions using C_{60} as a quencher in visible region ($\lambda_{emission}$ = 420-460 nm). It had been found [1] that a quenching was caused by resonance interaction of aromatic hydrocarbons with fullerene C_{60}. Relative intensity of complexes (I-IV) emission dependence on quencher molar concentration is satisfied to Stern-Volmer equation with Kq = (1,24-1,89)*10^5 l/mol because of a week CT-complex formation. The results are shown in the table.

Aryl	$C_{10}H_7$	C_6H_5	C_6H_4F	C_6F_5
$\lambda_{emission}$(nm)	428	456	425	453
Kq*10^{-5}(l/mol)	1.24	1.56	1.75	1.89
R^2	0.892	0.997	0.993	0.994

Kq – Stern-Volmer quenching constants
R^2 – correlation coefficient.

A comparison of the complex (I-IV) with organic ligands shows one order of magnitude increase of quenching constants. Such the compounds can be potentially used in photovoltaic devices.

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[1] R.G.Bulgakov, D.I.Galimov, *Russ.Chem.Bull.* **3**, 432-436(2007).