

INFLUENCE OF THE STRUCTURE OF ELECTRON-DONATING AROMATIC UNITS IN ORGANOSILICON LUMINOPHORES BASED ON 2,1,3-BENZOTHIADIAZOLE ELECTRON-WITHDRAWING CORE ON THEIR ABSORPTION-LUMINESCENT PROPERTIES

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Luminophores as functional materials are successfully applied in many fields of science and technology. Among them, 2,1,3-benzothiadiazole (BTD) derivatives play an important role due to their unique optical and electronic properties. Typically, BTD-based materials are symmetrical molecules composed by a donor-acceptor-donor (D-A-D) framework. The main advantage is that absorption-luminescent properties of such molecules can be easily tuned by the electronic properties of the extended donor substituents. On the other hand, introduction of silicon atoms into conjugated organic compounds can lead to the some specific electronic effects^{1,2}.

In this work a series of new linear π -conjugated oligomers based on BTD core and various combinations of 2,5-thiophene and 1,4-phenylene electron-donating units with terminal trimethylsilyl groups has been synthesized and characterized³. Investigation of their absorption-luminescent properties revealed that all of them possess high photoluminescence (PL) quantum yield and large Stokes shift both in diluted solutions and polymer matrix, while in the solid state their PL efficiency decreases. It was found that the main factor influencing the optical properties of the molecules obtained is the type of aromatic fragment directly attached to the central BTD moiety. Changing the chemical structure of the donor aromatic fragments from allows tuning the PL spectral maximum of the luminophores in wide range from 510 to 660 nm. It was shown that the presence of trimethylsilyl groups is responsible for their increased solubility, enhanced molar extinction coefficients and shortening the excited state lifetime without decreasing the PL efficiency.

References

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