MS34-P7 New easily-synthesisable and modifiable organic materials for applications in luminescent devices

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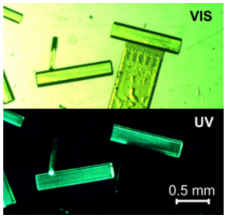
Arylboronic acids have found many applications in diverse areas of chemical science, such as organic synthesis, catalysis or crystal engineering. They can be also used as low-cost luminescent complexes (e.g., borinic-type compounds) for applications in optoelectronic devices.[1] Quite recently, we have introduced a new class of cheap, easily-synthesisable and modifiable organic luminescent materials based on ortho-phenylenediboronic acid.[2,3] The acid reacts with 8-hydroxyquinoline in high yield, both in solution and under mechanochemical conditions, and forms a brightly luminescent 8-oxyquinoline complex.[3] More importantly, the obtained complexes appeared to be electroluminescent. Similarly to the well-known borinic-based luminescent materials tuning of the emitted colour can be achieved mainly by modifications of the N,O-donor fragment.

Therefore, here we present a series of ortho-phenylenediboronic acid complexes with luminescent N,O-donor compounds (Figure 1).[4,5] The latter species themselves contain phenyl fragment and imidazo[1,2-a]pyridine ring, and thus may easily form intramolecular hydrogen bonding, which enables a further proton transfer. The proton transfer is responsible for their luminescent properties and can be tuned via the phenyl ring substituent character and a solvent choice. In the complex with ortho-phenylenediboronic this proton transfer is disabled. Hence, we checked the impact of the complexation of boronic acid on luminescent properties of the selected N,O-donor species. All new complexes were crystallized and structurally characterized using X-ray diffraction technique. Additionally, we examined their luminescence properties both in solution and in the solid state. The experimental data were supported by periodic energetic calculations and TDDFT studies.

(1) Durka, K. et al. J. Mater. Chem. C 2015, 3, 1354.(2) Durka, K.; Jarzembska, K. N.; Kamiński, R. et al. Cryst. Growth Des. 2013, 13, 4181. (3) Jarzembska, K. N.; Kamiński, R. et al. Acta Cryst 2015 A71, s333.(4) Stasyuk, A. J. et al. J. Org. Chem. 2012, 77, 5552. (5) Stasyuk, A. J. et al. J. Photochem. Photobiol. A 2016, Volume 314, 198.



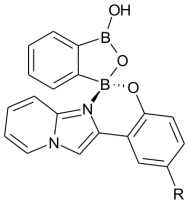


Figure 1. Luminescent properties of single crystals of new adducts (left panel). Schematic representation of new complexes based on ortho-phenylenediboronic acid and imidazo[1,2-a]pyridines (right panel).

Keywords: luminescent complexes , boronic acid, crystal engineering, spectroscopic properties