Design and fabrication of new organic luminophores for sensors

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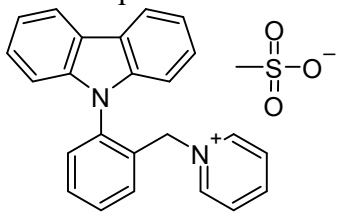
Abstract

Recently, solid-state organic luminophores have garnered significant attention due to their potential applications in organic light-emitting diodes, light-emitting cells, and optical sensors. Their low production cost makes them an attractive option for various industries. In 2019, Leduskrasts et al. reported solid-state luminophores that utilize π+–π interactions in a pyridinium–carbazole system [1]. The research in π+–π luminophore design culminated in the development of pyridinium luminophore **1** and its derivatives, demonstrating impressive quantum yields of up to 85% [2]. This advancement opened new possibilities for the practical application of these luminophores in various technologies.

In collaboration with the Institute of Atomic Physics and Spectroscopy of the University of Latvia, we have explored the potential applications of luminophore 1 in optical sensor systems. Our studies show that luminophore 1 demonstrates good stability of the optical properties when exposed to vapors of water and ammonia. However, a redshift of the UV-VIS spectra of luminophore **1** was observed when exposed to the vapors of acetic acid. This intriguing behavior suggests that luminophore **1** could be used in a solid-state gas sensor design for applications in environmental and industrial safety monitoring.

Herein, we report on the development of the purely organic pyridinium luminophores and their potential application in optical sensor development.



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References:

[1] Leduskrasts, K.; Suna, E. Aggregation induced emission by pyridinium–pyridinium interactions *RSC Adv.* **2019**, *9*, 460-465. DOI: 10.1039/C8RA08771G

[2] Leduskrasts, K.; Kinens, A.; Suna, E. The emission efficiency of cationic solid state luminophores is directly proportional to the intermolecular charge transfer intensity *Chem. Commun.* **2023**, 59, 6905 – 6908. DOI: 10.1039/d3cc01674a