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## Diketopyrrolopyrroles - the journey from ferrari pigments to fluorescent functional dyes

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Two-photon absorption (2PA) is a non-linear optical phenomenon with broad scope of applications. It has already been applied, or is under intensive investigation, in fields such as: optical limiting, polymerization-microfabrication, 3D-data storage, photodynamic therapy, two-photon excited fluorescence etc.<sup>1</sup> Structurally unique  $\pi$ -expanded diketopyrrolopyrroles were designed and synthesized. Strategic placement of a fluorene scaffold at the periphery of a diketopyrrolopyrrole via tandem Friedel-Crafts-dehydration reactions,<sup>2</sup> resulted in dyes with supreme solubility. Despite the extended ring system, the dye still preserved good solubility and was further functionalized using Pd-catalyzed coupling reactions, such as Buchwald-Hartwig amination. By placing two amine groups at peripheral positions of the resulting dyes, we have achieved values of two-photon absorption cross-section on the level of 2000 GM around 1000 nm, which generated a two-photon brightness of ~1600 GM. These characteristics in combination with red emission (665 nm) make these new  $\pi$ -expanded diketopyrrolopyrroles of major promise as two-photon dyes for bioimaging applications.

### Biography

Daniel T Gryko obtained his PhD from the Institute of Organic Chemistry of the Polish Academy of Sciences in 1997, under the supervision of Prof. J. Jurczak. After a Postdoctoral stay with Prof. J. Lindsey at North Carolina State University (1998–2000), he started his independent career in Poland. He became Full Professor in 2008. The same year he received the Society of Porphyrins and Phthalocyanines Young Investigator Award. His current research interests are focused on the synthesis of various functional dyes as well as on two-photon absorption, artificial photosynthesis, excited-state intramolecular proton transfer and fluorescence probes.

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