CeNT CENTRE OF NEW TECHNOLOGIES

UNIVERSITY OF WARSAW

invites to a seminar by

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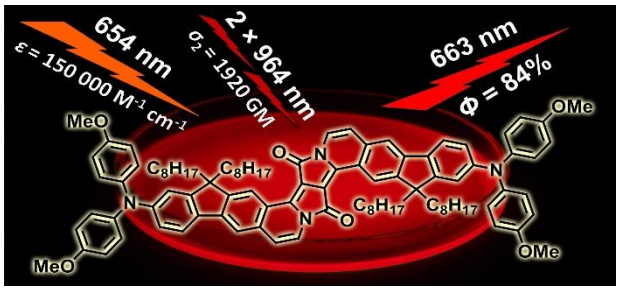
FROM PYRROLO[3,2-B]PYRROLES TO Π-EXPANDED DIKETOPYRROLOPYRROLES – THE FLUOROPHORES FOR THE FUTURE

7th of December 2017 at 12 p.m.

Venue: Centre of New Technologies, Banacha 2C,
Lecture Hall 0142 (Ground floor)

Host: Prof. Joanna Kargul

Diketopyrrolopyrroles (DPPs) have been developed as pigments for high-quality red objects such as Ferrari cars. Many years later they became working horse of organic electronics. Yet, combination of their optical properties makes them excellent candidates for many applications related to fluorescence such as fluorescent imaging. The synthesis of classical DPPs and structurally unique π-expanded diketopyrrolopyrroles will be shortly presented. Their optical properties such as absorption and emission of light and two-photon absorption will be presented in detail emphasizing key features. For example, 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 in combination with very high fluorescence quantum yield (Φ_{fl}), generated a two-photon brightness of ~1600 GM. These characteristics in combination with red emission (665 nm) make these new π-expanded diketopyrrolopyrroles of **major promise as two-photon dyes for bioimaging applications**. Finally, the corresponding *N*-alkylated DPPs displayed a remarkably strong solid-state fluorescence.



Recently we have discovered and optimized the first practical synthesis of non-fused pyrrole[3,2-*b*]pyrroles *via* domino reaction of aldehydes, primary amines, and butane-2,3-dione. Six bonds are formed in heretofore unknown tandem process, which gives rise to substituted pyrrole[3,2-*b*]pyrroles – the 'missing link' on the map of aromatic heterocycles. Unparalleled simplicity and versatility of this one-pot reaction, non-chromatographic purification and superb optical properties (including strong violet, blue or green fluorescence both in solution as well as in the solid state), brought these molecules from virtual non-existence to the intensively investigated area functional π-systems.