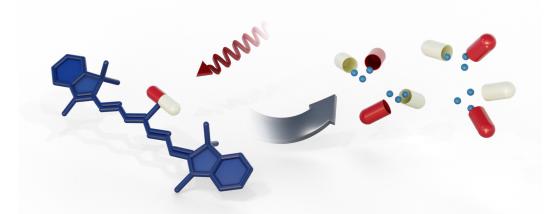
Cyanine Renaissance: Light-Operated Medicine

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Cyanine dyes represent an indispensable class of chromophores in modern chemistry and biology. Especially heptamethine cyanines (Cy7) are appreciated for their absorption and emission in the tissue-penetrating near-infrared region (NIR; 650–850 nm). Herein, I will demonstrate how the development of a synthetic methodology for the introduction of various substituents along the central cyanine chain enables tailoring their photochemical and photophysical properties within three orders of magnitude.[1,2] Exercising this control over the structure-property relationship by a single substituent was subsequently harnessed in a number of distinct applications in various fields including fluorescent probes, single molecule localization microscopy, biosensors or upconversion nanoparticles.[3] Finally, I will showcase how our synthetic strategy kick-started a novel class of cyanine-based photocages.[4] These molecules efficiently release a broad palette of organic payloads in aqueous media and human cells using a single NIR photon as the trigger with the focus on therapeutic applications.



[1] Lenka Štacková, Peter Štacko, Petr Klán, J. Am. Chem. Soc. 2019, 141, 7155-7162.

[2] Lenka Štacková, Eva Muchová, Marina Russo, Petr Slavíček, Peter Štacko, Petr Klán, J. Org. Chem. 2020, 85, 9776-9790.

[3] Hana Janeková, Marina Russo, Peter Štacko, Chimia 2022, 76, 763.

[4] Hana Janeková, Marina Russo, Urs Ziegler, Peter Štacko, Angew. Chem. Int. Ed. 2022, e202204391.