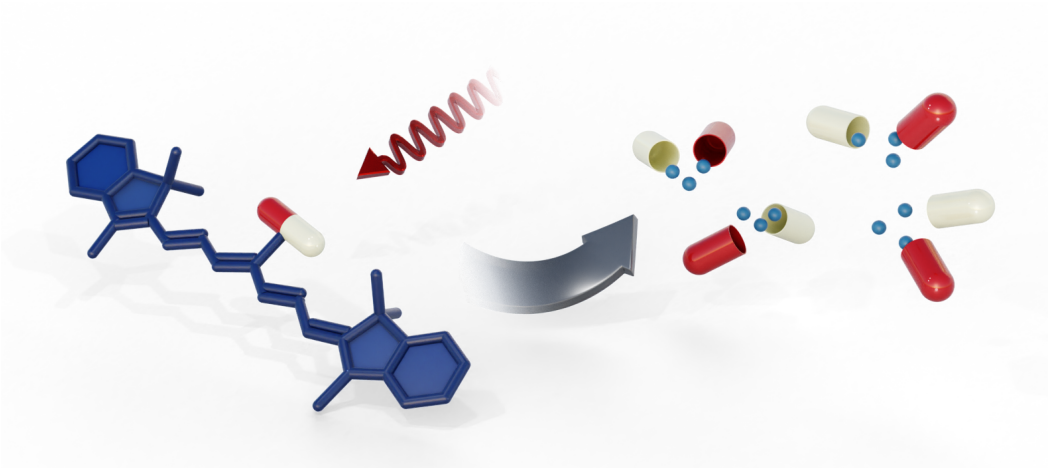
Cyanine Renaissance: Light-Operated Medicine

P. Stacko[1], H. Janekova[1], M. Russo[1]

[1]Department of Chemistry, University of Zurich, Winterthurerstrasse 190, Zurich, CH-8057

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.