Fakultät für Naturwissenschaften

Institut für Chemie

lädt ein

gemeinsam mit der Gesellschaft Deutscher Chemiker zum

Vortrag

von Herrn

Prof. Dr. Christopher Barner-Kowollik
Institut für Funktionelle Grenzflächen
Karlsruher Institut für Technologie (KIT)

“Wavelength-Resolved Photochemical Reactivity”

am: 29. Oktober 2026

um: 09:30 Uhr

wo: im Raum A12.232

Gäste sind herzlich willkommen!

TECHNISCHE UNIVERSITÄT
IN DER KULTURHAUPTSTADT EUROPAS
CHEMNITZ

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Fakultät für Naturwissenschaften

Institut für Chemie

Prof. Dr. Christopher Barner-Kowollik
Institut für Funktionelle Grenzflächen
Karlsruher Institut für Technologie (KIT)

"Wavelength-Resolved Photochemical Reactivity"

When selecting a light source for photochemical processes such as photopolymerizations, photon absorption by a chromophore at a given wavelength is often used to predict reaction efficiency. However, in 2017, we have discovered a strong mismatch between absorption spectra and wavelength-dependent reactivity for many photochemical processes. Herein we investigate the origin of this mismatch in photocycloadditions and photopolymerizations. We propose a theory linking photophysics and photochemistry: Selective excitation of specific microenvironments can trigger molecular transitions that favour wavelength-dependent reactivity, leading to the molecular ensemble to depart from Kasha's rule. Time-resolved and steady-state fluorescence spectroscopy reveal strong red-edge effects, confirming the selectivity. By synthetically tethering chromophores, we further demonstrate the role of microenvironments and wavelength-dependent excited-state lifetimes. This mechanism explains mismatches observed in many photochemical systems and suggests that tuning the chromophore environment can control wavelength-dependent reactivity in applications from additive manufacturing to photodynamic therapy.

References

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