# Shining light on similar crystals reveals photoreactions can differ

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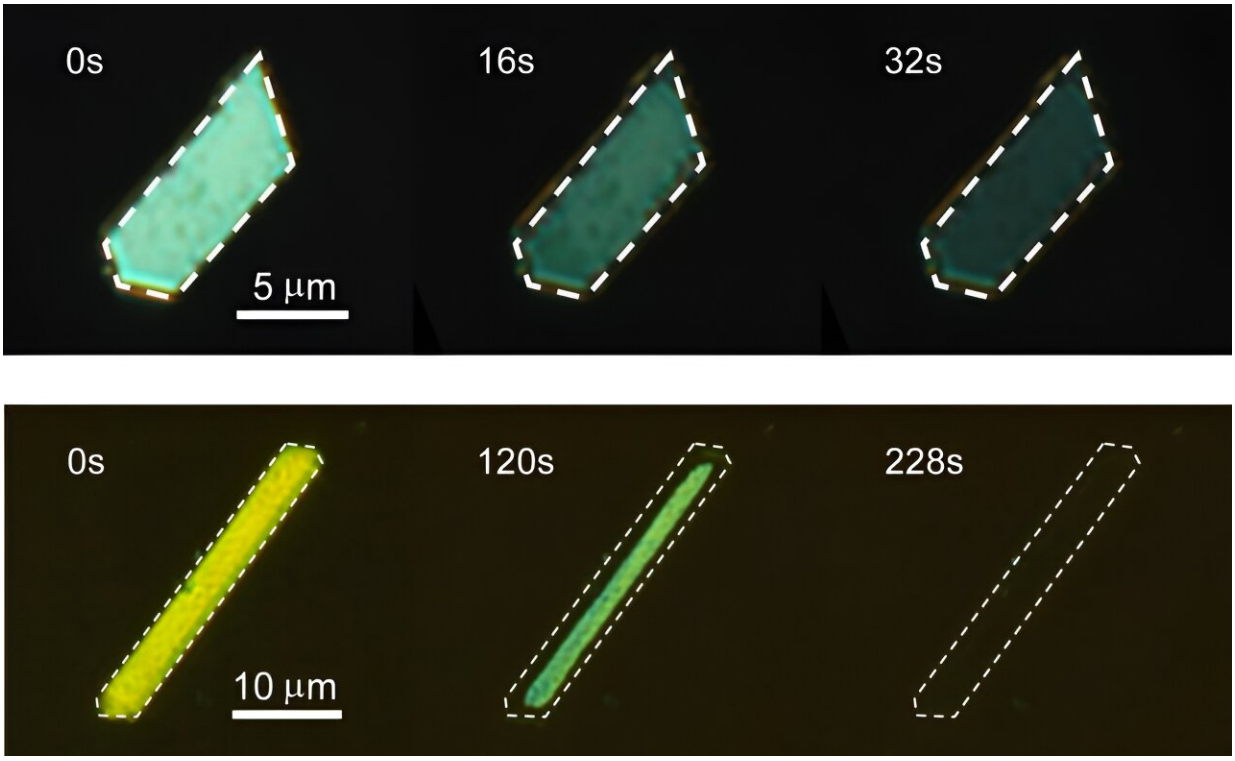


Top row: Photoreaction proceeds uniformly throughout the crystal. Bottom row: Photoreaction proceeds non-uniformly from the edge to the center of the crystal. Credit: Osaka Metropolitan University

A rose by any other name is a rose, but what of a crystal? Osaka Metropolitan University-led researchers have found that single crystals of four anthracene derivatives with different substituents react

differently when irradiated with light, perhaps holding clues to how we can use such materials in functional ways.

Graduate student Sogo Kataoka; Dr. Daichi Kitagawa, a lecturer; and Professor Seiya Kobatake of the Graduate School of Engineering and colleagues compared the photoreactions of the single crystals when the entire anthracene crystal was irradiated with light.

The findings are published in *Chemical Science*.

For two of the anthracene derivatives, the photoreaction proceeds uniformly throughout the crystal. For the other two, the photoreaction proceeds non-uniformly from the edge to the center of the crystal. The research team also found that in non-uniform photoreactions, the molecules must rotate significantly during the process, so the reaction proceeds from the edge of the crystal where sufficient rotational space is available.

"If we can control the arrangement and reactivity of molecules in crystals based on the findings of this research, it will be possible to make reactions proceed in a spatially selective manner and induce photoreactions only at the desired location," Dr. Kitagawa explained. "In the future, we aim to shine a light on more detailed factors by conducting 3D simulations and designing functional materials that can exhibit arbitrary behavior."

**More information:** Relationship between spatially heterogeneous reaction dynamics and photochemical kinetics in single crystals of anthracene derivatives, *Chemical Science* (2024). DOI: 10.1039/d4sc03060e

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