Researchers synthesize new compounds within living cells using light

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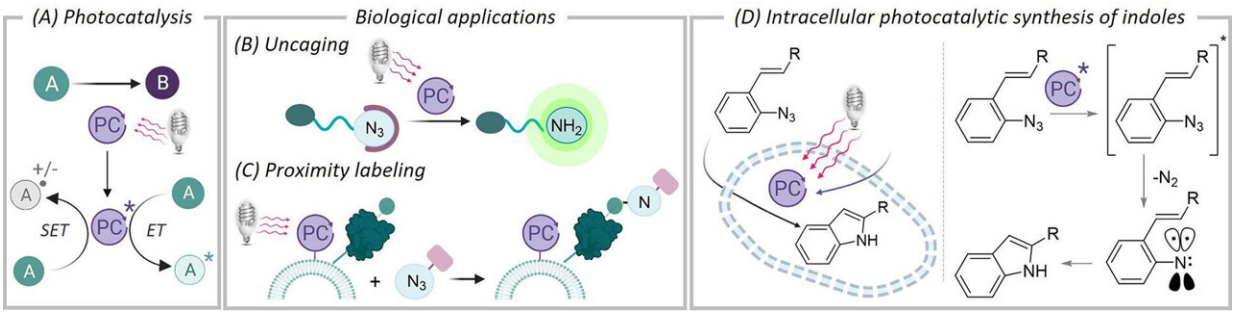

Credit: *Journal of the American Chemical Society* (2024). DOI: 10.1021/jacs.3c13647

Plants harness chlorophyll to capture sunlight and kickstart photosynthesis, a crucial process on our planet that converts luminous energy into chemical fuel while producing oxygen. This pivotal chemical energy is subsequently utilized by plants, algae, and select bacteria to metabolize carbon dioxide and water into sugars.

Now, scientists at the Center for Research in Biological Chemistry and Molecular Materials (CiQUS) have achieved a breakthrough by integrating non-native photosensitizers into mammalian cells. This revelation showcases the capability of these substances to also absorb green or blue light, thus instigating artificial chemical reactions within cellular environments. Notably, this innovative approach has been

employed for synthesizing indoles, chemical compounds boasting significant biological activities.

Such findings underscore the feasibility of leveraging light to fabricate functional molecular products, including fluorescent variants, within biological settings. Published in the *Journal of the American Chemical Society (JACS)*, this study marks the pioneering demonstration of forging synthetic chemical bonds within cells through photocatalysis.

Photocatalysis emerges as a transformative chemical technology with vast socioeconomic implications. It empowers the utilization of light as an energy source to activate catalysts and instigate chemical transformations, thereby facilitating sustainable synthetic endeavors.

"The evidence of employing these synthetic photocatalysis technologies within biological milieus, we believe, heralds a new frontier at the frontier of chemistry and biology," remarks Professor José Luis Mascareñas, co-leading the research alongside Dr. María Tomás Gamasa. "Moreover, we anticipate that in the foreseeable future, these technologies will unveil novel strategies for precisely manipulating human cells, thus fostering the development of innovative therapeutic interventions."

Dr. Sara Gutiérrez and Ph.D. student Cinzia D'Avino spearheaded the experimental work, conducted entirely at CiQUS.

More information: Cinzia D'Avino et al, Intracellular Synthesis of Indoles Enabled by Visible-Light Photocatalysis, *Journal of the American Chemical Society* (2024). DOI: 10.1021/jacs.3c13647

Provided by Center for Research in Biological Chemistry and Molecular Materials (CiQUS)