SCIENTIFIC HIGHLIGHT

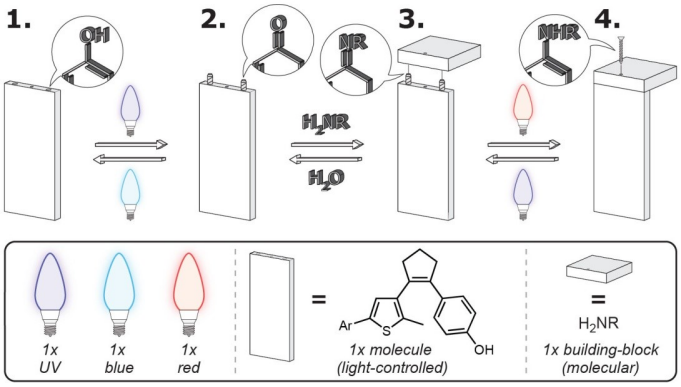
Light-controlled molecules: Scientists develop new recycling strategy

Discovery lays the foundation for recycling of yet non-recyclable plastics

Robust plastics are composed of molecular building-blocks, held together by tough chemical linkages. Their cleavage is extremely difficult to achieve, rendering the recycling of these materials almost impossible. A research team from the Humboldt-Universität zu Berlin (HU) developed a molecule, which can drive or reverse specific chemical reactions with light of different colors.

This enables making and breaking of connections on the molecular scale, even if they are exceptionally strong. The discovery paves the way for the development of novel recycling methods and sustainable materials. Light-driven recovery of individual molecular building-blocks has great potential to enable recycling of yet non-recyclable plastics without compromising on color, quality, or shape.

"The working principle of our system is quite similar to the one of ready-to-assemble furniture" explain Michael Kathan and Fabian Eisenreich, the two first authors of this study. "We are able to repetitively assemble or disassemble molecular architectures, but instead of a hammer and screw-driver, we use red and blue LEDs as tools to control our molecules."



A light-controlled molecule in combination with a specific light sequence allows for bond formation (UV and red light; 1. to 4.) or scission (UV and blue light; 4. to 1.) with molecular building-blocks. Visualization: Michael Kathan.

The results of their study have just been published in Nature Chemistry.

Light-driven molecular trap enables bidirectional manipulation of dynamic covalent systems
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Nature Chemistry 10 (2018) 1031
DOI: 10.1038/s41557-018-0106-8