To observe photoswitches, stick on a platinum atom

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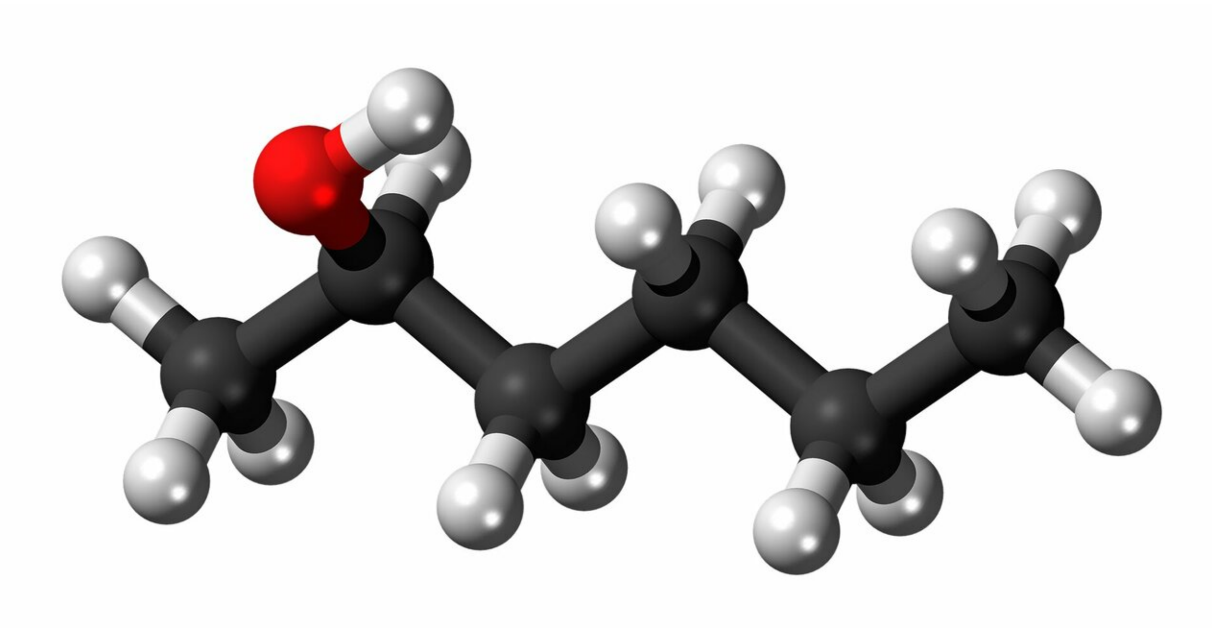

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Advances with photoswitches could lead to a smartphone that's soft and flexible and shaped like a hand so you can wear it as a glove, for example. Or a paper-thin computer screen that you can roll up like a window shade when you're done using it. Or a TV as thin as wallpaper that you can paste on a wall and hardly know it's there when you're not watching it.

Photoswitches, which turn on and off in response to light, can be stitched together to replace the transistors used in electronic devices that control the flow of the electric current.

Commercial silicon transistors are brittle, nontransparent, and typically several microns thick, about the same thickness as a red blood cell. In contrast, photoswitches are one or two nanometers, about 1,000 times thinner. They can also be mounted on graphene, a transparent, flexible material.

The trouble with photoswitches is that, even with powerful electron microscopes, their behavior is very difficult to observe. This is because the photoswitches need to be placed on a background made of similar elements, making them hard to discern.

In a paper in the journal *ACS Nano*, Grace Han, assistant professor of chemistry at Brandeis University and her lab report that they've come up with a solution to this problem.

In the research, Han and colleagues worked with a popular type of photoswitch called azobenzene, an arrangement of carbon, hydrogen, and nitrogen atoms. On either side of the azobenzene, they attached a platinum atom that is now visible against the background under an electron microscope.

By analyzing the change in positions of the now visible ends of the azobenzene, researchers can begin to understand how photoswitches transform when exposed to light.

"Until now, we've really had no clear images of photoswitches," Han says. "Now we can see how exactly they switch on and off, so we can use them in the next generation of electronic materials."

More information: Mihael A. Gerkman et al. Direct Imaging of Photoswitching Molecular Conformations Using Individual Metal Atom Markers, *ACS Nano* (2018). DOI: 10.1021/acsnano.8b08441

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