UC Irvine chemists discover new way of using light to perform experiments

The method reduces the energy needed to drive chemical reactions.

Friday, January 24, 2025

Lucas Van Wyk Joel
UC Irvine Physical Sciences Communications

Professor Matthew Sheldon of the UC Irvine Department of Chemistry used technology that allows for the manipulation of light on nanometer scales.

Picture Credit:
Matthew Sheldon / UC Irvine

Professor Matthew Sheldon of the UC Irvine Department of Chemistry and a team of researchers that includes collaborators in the UC San Diego Department of Chemistry recently published research in *Nature Chemistry* describing a new way to drive chemical reactions using light rather than heat or other chemical catalysts.

“This discovery moves our field toward the possibility of a new strategy for light-driven chemistry – sometimes called ‘polariton chemistry’ – where meticulously designed light fields can precisely and dynamically guide chemical transformations.”

The work, Sheldon explained, means chemists can now control chemical reactions using much less energy than they did before and with much greater precision – something that could lead to dramatic decreases in energy consumption in industrial chemical settings.

The team used cutting-edge techniques from the field of nanophotonics that allow for the precise manipulation of light on extremely small scales – something that allowed them to explore how light interacts with matter in new ways.

The leap forward came when the team placed chemical samples into their nanophotonic apparatus.

“Almost immediately, we observed a surprising and profound resonant interaction between the sample and infrared radiation,” Sheldon said. “This interaction was far more impactful than we had anticipated – it fundamentally altered the chemical behavior of the system. Seeing this unfold was exhilarating, as it revealed a new pathway to control chemical processes with light.”

Light-driven chemical reactions open the door for the development of new technologies and materials that can only form when light interacts with matter.

“We contribute a new tool to the scientific community – one that not only advances fundamental chemistry but also points to transformative applications in energy, materials science and beyond,” said Sheldon. “This work isn’t just about understanding molecules differently – it’s about imagining possibilities for harnessing new classes of light-matter interactions in the service of science and society.”

News Briefs
Chemistry
The Future of Health

The Future of Fundamental Science
View PDF