Novel application of optical tweezers colorfully shows molecular energy transfer

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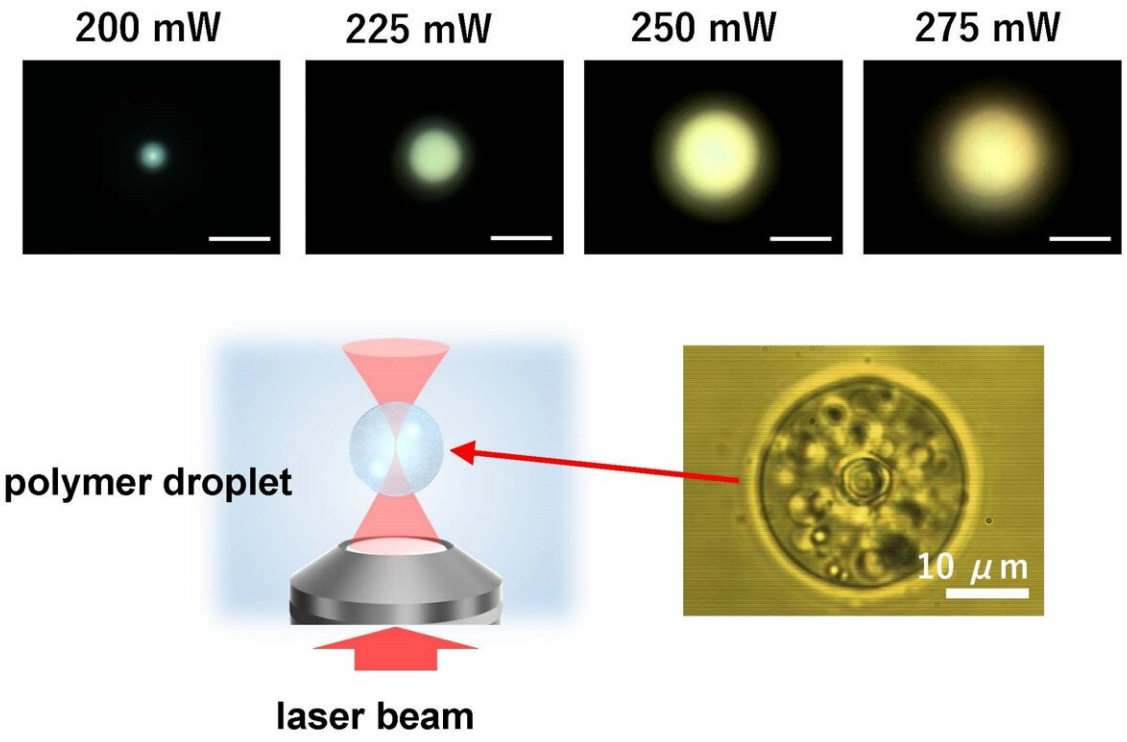

Continuous laser irradiation causes Förster resonance energy transfer in the polymer droplet to accelerate, as seen in the changing color. Credit: Osaka Metropolitan University

A novel technique with potential applications for fields such as droplet chemistry and photochemistry has been demonstrated by an Osaka

Metropolitan University-led research group.

Professor Yasuyuki Tsuboi of the Graduate School of Science and the team investigated Förster resonance energy transfer (FRET), a phenomenon seen in photosynthesis and other natural processes where a donor molecule in an excited state transfers energy to an acceptor molecule.

Using dyes to mark the donor and acceptor molecules, the team set out to see if FRET could be controlled by the intensity of an optical force, in this case a laser beam. The findings were published in *Advanced Optical Materials*.

By focusing a laser beam on an isolated polymer droplet, the team showed that increased intensity accelerated the energy transfer, made visible by the polymer changing color due to the dyes mixing.

Fluorescence could also be controlled just by adjusting the laser intensity without touching the sample, offering a novel non-contact approach.

"Although this research is still at a basic stage, it may provide new options for a variety of future FRET research applications," Professor Tsuboi explained. "We believe that extending this to quantum dots as well as new polymer systems and fluorescent molecules is the next challenge."

More information: Tatsuya Nagai et al, Förster Resonance Energy Transfer Control by Means of an Optical Force, *Advanced Optical Materials* (2024). DOI: 10.1002/adom.202400302

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