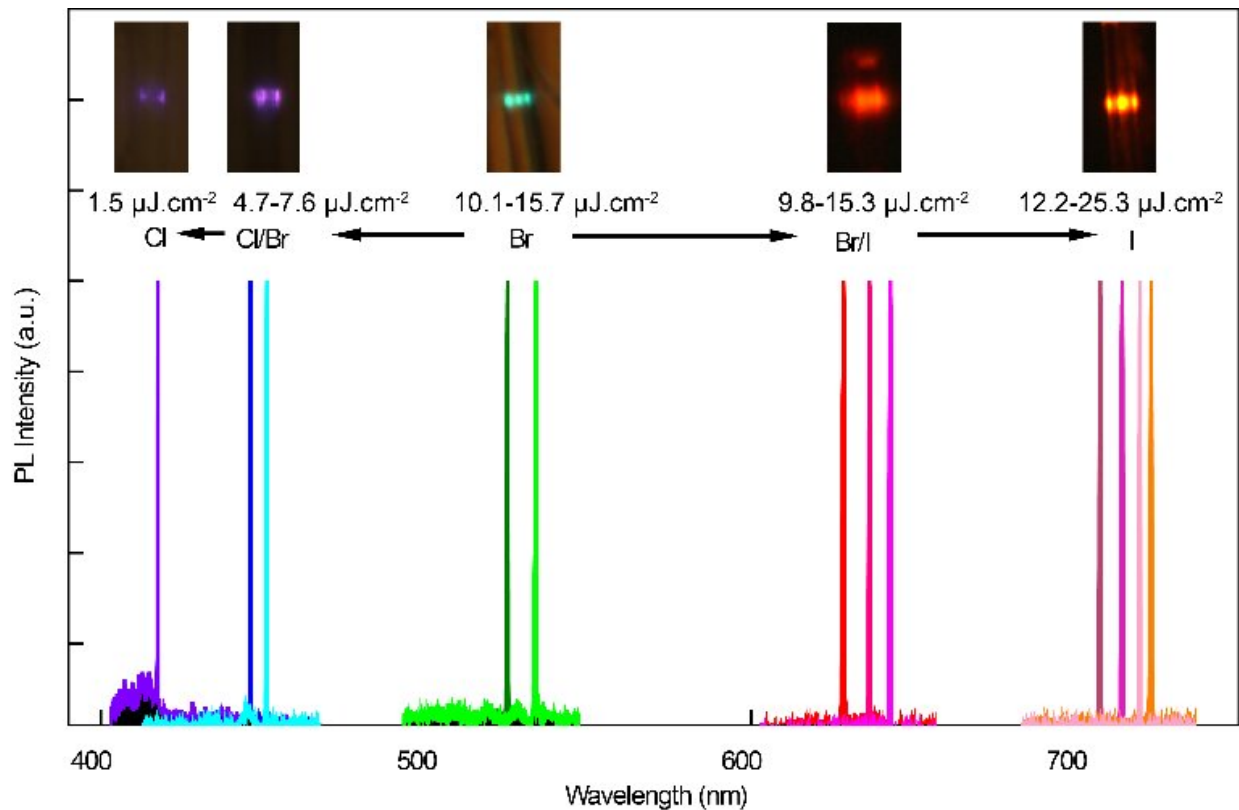


Scientists obtain broad-band single-mode lasers in colloidal quantum dots

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Broad-band CQDs single-mode lasers in CQDs/ZnO composited microcavity.
Credit: SIOM

In the past two decades, great efforts have been made to achieve lasers based on colloidal quantum dots (CQDs), especially CQD-based single-mode lasers, which is important in on-chip optical processing and data

storage due to low noise and good monochromaticity.

Although there are concrete demonstrations of solution-processed CQDs films enabled optical microcavities, the radiation collected from the samples exhibits random [lasing](#), or multi-mode lasing due to low coupling efficiency, low quality factor, and it's often difficult to control [laser](#) mode. Thus, CQDs based single-mode lasers across the whole visible spectral range haven't been achieved yet.

A research team from the Shanghai Institute of Optics and Fine Mechanics has recently demonstrated perovskite CQDs single-mode laser with good performance across the entire visible spectra range. The work was published in the *Journal of Materials Chemistry C*.

In this study, a composited microcavity was obtained through the conformal deposition of cesium lead halide perovskite (LHP) CQDs on a high quality individual sub-micron ZnO rod by dip-coating self-assembled techniques. A single-mode lasing with high quality factor and low threshold was obtained.

By tuning the size of ZnO microrods, size of CQDs, and the elements of CQDs, broad-band tunable single-mode lasers can be achieved in the whole visible spectra region.

Experiments, together with [theoretical studies](#), analyzed the physical mechanism and output performance of QDs laser and proposed that the efficient coupling between CQDs and microcavity is key to efficient and high-quality lasing.

More information: Chun Zhou et al. Broad-band lead halide perovskite quantum dot single-mode lasers, *Journal of Materials Chemistry C* (2020). [DOI: 10.1039/D0TC02551H](https://doi.org/10.1039/D0TC02551H)

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