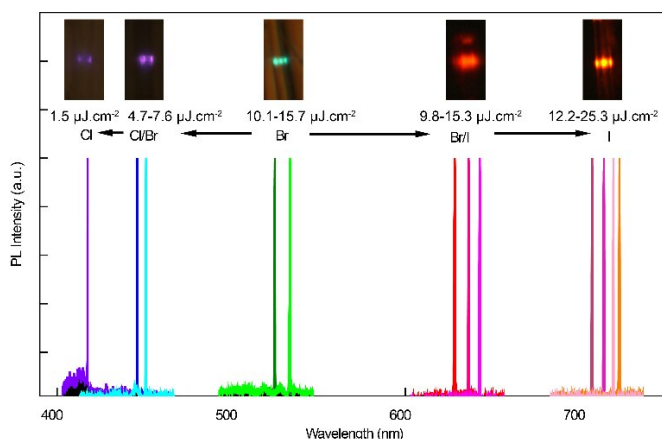


Scientists obtain broad-band single-mode lasers in colloidal quantum dots

17 September 2020, by Zhang Nannan



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)

Provided by Chinese Academy of Sciences

APA citation: Scientists obtain broad-band single-mode lasers in colloidal quantum dots (2020, September 17) retrieved 17 May 2021 from <https://phys.org/news/2020-09-scientists-broad-band-single-mode-lasers-colloidal.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.