

Scientists create new type of nanocrystal

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U.S. government scientists have created a new type of nanocrystal that can be used as a laser material.

The scientists said their nanocrystal is a "soft" optical material that can be processed in solution, offering flexibility for laser design, with a potential use in lab-on-a-chip technologies and quantum information processing devices.

Semiconductor nanocrystals have excellent light-emitting properties, making them good candidates for use in laser applications. But achieving the crucial condition for lasing -- optical amplification -- has proved problematic. Normally nanocrystals need to contain at least two excitons, or electron-hole pairs, which are the precursors for light emission in semiconductors. But because of the nanocrystal's tiny size, the excitons annihilate each other before optical amplification can occur.

Now Victor Klimov and colleagues at the Alamos National Laboratory have designed nanocrystals with cores and shells made from different semiconductor materials in such a way that electrons and holes are physically isolated from each other.

The scientists said in such engineered nanocrystals, only one exciton per nanocrystal is required for optical amplification. That, they said, opens the door to practical use in laser applications.

The research is reported in the journal *Nature*.

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