

# Quantum Dots

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**In News:** Recently, INSPIRE Faculty fellowship using chemical reactions to modify the surface of these nanoscale crystals called quantum dots (QDs) for fabricating optical materials that can have sustainable applications in optical sensors, light-emitting usages, composites and fluorescent biological labels.

## What is Quantum Dots ?

- Quantum dots (QDs) are man-made nanoscale crystals that can transport electrons. When UV light hits these semiconducting nanoparticles, they can emit light of various colors.
- These artificial semiconductor nanoparticles that have found applications in composites, solar cells and fluorescent biological labels.
- Electrons orbit the center of a single quantum dot similar to the way they orbit atoms, the charged particles can only occupy specific permitted energy levels.
- At each energy level, an electron can occupy a range of possible positions in the dot, tracing out an orbit whose shape is determined by the rules of quantum theory. A pair of coupled quantum dots can share an electron between them, forming a qubit.
- Researchers at the National Institute of Standards and Technology (NIST) have for the first time created and imaged a novel pair of quantum dots.
- These are tiny islands of confined electric charge that act like interacting artificial atoms.
- Such “coupled” quantum dots could serve as a robust quantum bit, or qubit, the fundamental unit of information for a quantum computer.
- Moreover, the patterns of electric charge in the island

can't be fully explained by current models of quantum physics, offering an opportunity to investigate rich new physical phenomena in materials.

- They could perform much larger, more complex operations than classical bits and have the potential to revolutionize computing.

## **INSPIRE**

- “Innovation in Science Pursuit for Inspired Research (INSPIRE)” is an innovative programme sponsored and managed by the Department of Science & Technology for attraction of talent to Science.
- The basic objective of INSPIRE is to communicate to the youth of the country the excitements of creative pursuit of science, attract talent to the study of science at an early age and thus build the required critical human resource pool for strengthening and expanding the Science & Technology system and R & D base.
- A striking feature of the programme is that it does not believe in conducting competitive exams for identification of talent at any level.
- It believes in and relies on the efficacy of the existing educational structure for identification of talent.