TECHNOLOGY

Positioning Quantum Dots in Devices by Electroosmotic Feedback Control

OVERVIEW

Semiconductor quantum dots (QDs) are ideal candidates for storing and manipulating quantum information. To perform scalable quantum computation and long distance quantum networking requires the ability to deterministically position and fix many QDs into a single device, and ability that is currently not available. Such integration would enable one to engineer ultra compact computers that would fit on a small semiconductor chip. Quantum dot structures are usually formed by a bottom-up self assembly approach, which results in random spatial and spectral distribution. This randomness makes it extremely difficult to position a resonant QD inside an optical micro-cavity, a necessary step for implementing quantum devices.

Researchers at the University of Maryland, College Park have proposed a method for deterministically positioning single colloidal QDs with the desired spectral properties inside micro-cavity resonators using micro-fluidics coupled with a technique called electroosmotic flow control. This unique approach allows nanometer scale positioning accuracy, which cannot be achieved by any other known method.

Deterministically coupling quantum dots to photonic crystal cavity waveguide networks would enable a wide range of novel applications in quantum computing and quantum networking. In the area of quantum computing the methods that have been explored by the researchers could form the basis for implementing scalable universal quantum computation via two promising approaches, Linear optical Quantum Computation (LOQC) and quantum computation based on Dipole Induced Transparency (DIT).

For more information, please contact the Office of Technology Commercialization, University of Maryland College Park, via phone at (301) 405-3947 or E-mail at otc@umd.edu.

CONTACT INFO

UM Ventures
0134 Lee Building
7809 Regents Drive
College Park, MD 20742
Email: umdtechtransfer@umd.edu
Phone: (301) 405-3947 | Fax: (301) 314-9502

Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Nanotechnology + Nanoparticles + Nanomaterials
- Engineering
- Devices

EXTERNAL RESOURCES

PS-2007-118