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Fabrication Methods for Positioning of Quantum Dots[1] REBECCA KRAMER[2], RUPERT OULTON, VOLKER SORGER, NITIPAT PHOLCHAI, University of California, Berkeley, XIANG ZHANG, NSF Nanoscale Science and Engineering Center, University of California, Berkeley — Quantum dot positioning is highly useful in terms of integrating nanoemitters into nanostructures, such as nanocavities and quantum dot waveguides. Demonstration of control over the positioning of quantum dots has proven difficult, and consequently construction of single-photon emitting systems has been hindered. We report the ability to reliably position nanoscale functional objects, specifically quantum dots, within a well-defined location. Programmed assembly of DNA linked quantum dots on both gold and silver substrates is obtained by Electron Beam Lithography patterning and a series of surface chemical functionalizations. A single quantum dot was successfully positioned within 100 nm of the desired location in 36 percent of the experiments. Furthermore, the method was completely reproducible within 500 nm accuracy. This method has the potential to functionalize quantum dots in even smaller pattern sizes.

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[2]This work was done at Berkeley, however the author is now affiliated with Harvard University.

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