Deterministic Nanowire Assembly

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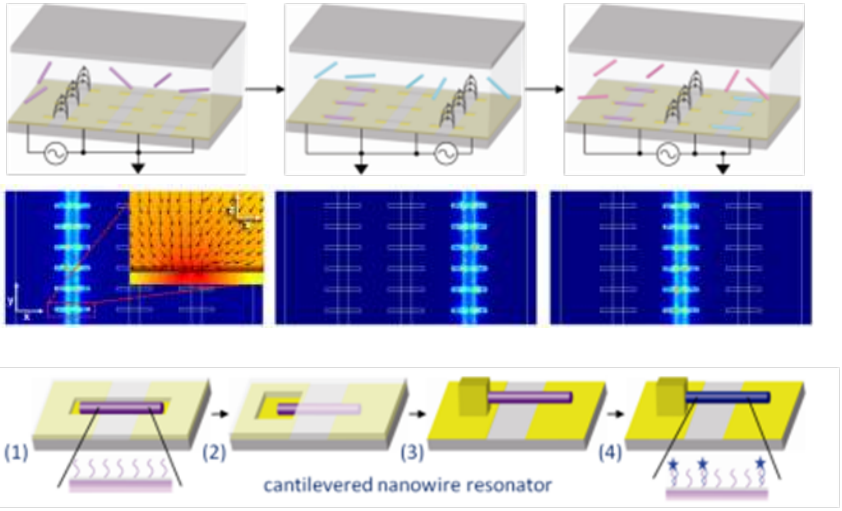

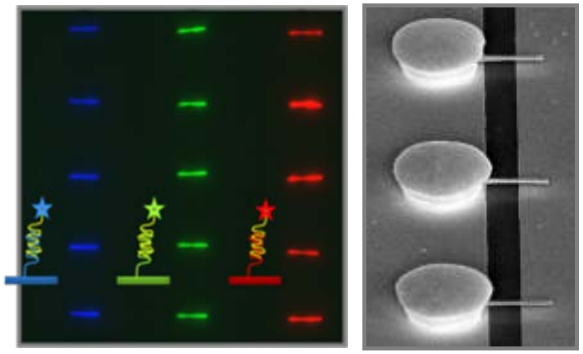

Fluorescence optical microscope images (right) and FESEM (left) of nanowire device arrays integrated by electric-field assisted directed assembly method.

A key challenge in nanowire integration is the lack of scalable, high-yield directed assembly techniques that provide the requisite control over global/local position and registration to underlying circuit.

Coupling sequential delivery with a programmable assembly voltage directs different nanowire populations to different regions of the chip and then preferentially aligns individual nanowires within lithographically-defined microwells.

Fluorescence images show high yield assembly and integration of three populations of nanowires functionalized with different biomolecule probes. Binding selectivity to complementary DNA targets was retained following assembly and integration.

Morrow, Mayer, Keating *et al. Science*, 323, 352 (2009).

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Hybrid nanomanufacturing processes are being developed to add new capabilities and functionality to silicon integrated circuit technology.