SELF-ORGANIZATION OF COMPLEX CARBON NANOTUBE PATTERNS DIRECTED BY CRYSTAL SURFACES

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The organization of carbon nanotubes into well-defined horizontal geometries and arrays on surfaces is a critical prerequisite for their large-scale integration into nanocircuits. We have elaborated a series of surface-directed mechanisms of carbon nanotube growth, which can be classified as different modes of orientational epitaxy: Lattice-directed epitaxy (by atomic rows), ledge-directed epitaxy (by atomic steps) [1], and graphoepitaxy (by nanofacets) [2]. Some of these modes of "nanotube epitaxy" can be simultaneously combined with electric field-directed growth [3] for the orthogonal self-assembly of carbon nanotube crossbar architectures [4], and with gas flow for the self-organization of nanotube serpentines [5]. Nanotube epitaxy on different crystal surfaces can thus controllably yield a wide range of unprecedented geometries [6], including highly straight [1,2], kinked [1], wavy [2], crossbar [4], serpentine [5], coiled [5], and more.

References:

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Figures: