

1D/2D Carbon-based Nanobiomaterials and Microdevices for Biomedical Applications

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Controlled assembly of biopolymers, minerals, and 1D/2D carbon nanostructures, namely graphene, carbon nanotube (CNT), and their chemical derivatives, can lead to nanocarbon-bio hybrids that not only impart specific bio-functionalities but also possess extraordinary physical and chemical properties. CNT and graphene are among the most frequently investigated nanomaterials in the past decade, and yet both continue to offer exciting opportunities for the discovery of new science and applications. In this talk, I will present our recent progress in the creation of advanced materials and devices through hierarchical organization of nanocarbon-bio hybrids. Examples include CNT and graphene oxide nano-porous membranes [1,2] and iontronic devices [3], various C/inorganic hybrid architectures [4], sp²-C incorporated 3D tissue scaffolds [5,6], and arrayed nanobiosensors [7]. Our main interests are to develop new material and surface chemistries for material synthesis, to pursue fundamental studies on interface dictated phenomena, and to explore potential applications, especially in biosensing and tissue engineering.

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