Carbon Filaments and Nanotubes: Common Origins, Differing Applications? [

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Monografía

Carbon filament, vapor grown carbon fibers and carbon nanotubes have been discovered to have remarkable properties, opening they way for their use in intriguing and novel applications in electronics, chemistry and materials science. There are many similarities between nanotubes and filaments, leading many researchers to critically compare the two materials, their production, and potential applications. The two materials are compared and contrasted in depth in the present book, which is a comprehensive review of current research activity, growth mechanisms, physical properties, industrial production, and applications. The structures are discussed using a unified approach, which helps to compare growth mechanisms, contrasting morphological differences, and detailing how novel properties depend on such differences

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Contenido: I: Introduction to carbon fibers and carbon nanotubes -- Vapor-grown carbon fiber research and applications: achievements and barriers -- Electronic properties of carbon nanotubes and applications -- From vapor-grown carbon fibers (VGCFs) to carbon nanotubes -- II: Production of vapor grown carbon fibers and nanotubes -- Nucleation and growth of carbon filaments and vapor-grown carbon fibers -- Carbon nanotubes formation in the arc discharge process -- Catalytic production, purification, characterization and application of single-and multiwall carbon nanotubes -- Optimizing growth conditions for carbon filaments and vapor-grown carbon fibers -- Gasification and surface modification of vapor-grown carbon fibers -- Growth of nanotubes: the combined TEM and phase-diagram approach -- First-principles theoretical modeling of nanotube growth -- Controlled production of tubular carbon and BCN architecture -- Large-scale production of VGCF -- III: Characterization and applications -- Diffraction by molecular helices - The range of morphologies of sp2carbon and the basic theory of diffraction by an atomic helix -- Diffraction by molecular helices -Transmission electron microscopy and diffraction by nanotubes and other helical nanostructures -- STM investigation of carbon nanotubes -- Interpretation of the STM images of carbon nanotubes -- Mechanical properties of vapor grown carbon fibres and VGCF-thermoplastic composites -- Atomic force microscopy investigation of carbon nanotubes -- Structural and electronic properties of carbon nanotube junctions -- Applications of submicron diameter carbon filaments -- The role of rheology in the processing of vapor grown carbon fiber/thermoplastic composites -- Tensile, electrical and thermal properties of vapor grown carbon fibers composites -- Properties and applications of carbon nanotubes - Materials Science Aspects -- Novel applications of VGCF including hydrogen storage -- Roundtable discussions -- Common and disparate elements in filament and nanotube growth -- Properties of imperfect carbon structures -- Likely applications: Near and long term

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