# Multi-Walled Carbon Nanotube: Optimization of properties for different applications

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Multi-walled carbon nanotubes (MWCNTs), due to their remarkable mechanical, chemical, and electronic properties, are known as the most promising components for different nanotechnological applications. Nanotube properties significantly depend on their structure (diameter distribution, length, morphology of agglomerates, defectiveness, concentration of impurities, etc.), which in turn depends on the type of process and on reaction parameters used for the production. The most important factors influencing CVD nanotube properties are related to the nature of catalysts. Upon variation of the nature of catalysts (metals, supports, metal-support interaction, and the effect of promoters) nanotube characteristics can be skillfully manipulated to suit the needs in different applications. The production of high quality composites requires the fulfillment of conditions of uniform MWCNT distribution in polymer, metal or ceramic matrix, which in turn require the formation of specific interfaces between nanotube surface and composite matrix. The optimization of nanotube content in a composite, which depending on MWCNT diameter distribution and influencing the percolation threshold, is also crucially important to provide desirable composite properties. The analysis of the properties of MWCNT based composites leads to conclusion that for every type of composite specific optimal type of nanotubes is required. This paper reviews the synthesis of MWCNTs with variable properties especially focusing on their structure and properties (mechanical, electrical and chemical). Various parameters influencing the MWCNT growth and properties, along with post synthesis treatments determining the nanotube structure and surface composition, are also discussed.