Understanding and Controlling Single-Wall Carbon Nanotube Synthesis with Time-Resolved in situ Diagnostics

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Application and commercialization of single-wall carbon nanotubes (SWNT) have been hampered by a lack of control over the synthesis process, and low production quantities. Time-resolved *in situ* spectroscopic investigations are described which are yielding some of the first direct determinations of carbon nanotube growth mechanisms and rates necessary to evaluate strategies for controllable synthesis and large-scale production. Synthesis of SWNT with lengths controlled by *in situ* diagnostics and growth of SWNT by *condensed phase conversion* will be discussed with implications for applications in molecular electronics and structural materials.

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