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Transient Size Analysis of Carbon Nanotube Synthesized in Diffusion Flame Environment
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Abstract
Flame synthesis involves a complex physio-chemical process to create optimal conditions for carbon nanotube (CNT) growth. In the present study, a nickel catalyst undergoes exposure to a methane diffusion flame at various durations, with subsequent measurement of the CNT diameter. The average CNT diameter exhibits an increment until the 30-second mark, after which the diameter stabilizes at 35 nm. This growth is attributed to the nearly instantaneous occurrence of catalyst nanoparticle formation and CNT growth within the flame. The reshaping of size, crucial in determining CNT diameter, results from the aggregation-agglomeration of nanoparticle formation. The growth mechanism is partially elucidated by the vapor-liquid-solid and solvation-diffusion-precipitation mechanisms, offering insights into the governing processes.

Author Keywords
carbon nanotubes; diameter; flame synthesis; growth mechanism; nickel catalyst

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