

Abstract Submitted
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Ultra-high-yield growth of vertical single-walled carbon nanotubes GUANGYU ZHANG, DAVID MANN, LI ZHANG, Stanford University, ALI JAVEY, YIMING LI, ERHAN YENILMEZ, QIAN WANG, HONGJIE DAI, Stanford University, JAMES MCVITTIE COLLABORATION, YOSHIO NISHI COLLABORATION, JAMES GIBBONS COLLABORATION — An oxygen-assisted hydrocarbon chemical vapor deposition method is developed to afford large-scale, highly reproducible, ultra-high-yield growth of vertical single-walled carbon nanotubes. It is revealed that reactive hydrogen species, inevitable in hydrocarbon-based growth, are damaging to the formation of sp²-like SWNTs in a diameter-dependent manner. The addition of oxygen scavenges H species and provides a powerful control over the C/H ratio to favor SWNT growth. The revelation of the roles played by hydrogen and oxygen leads to a unified and universal optimum-growth condition for SWNTs. Further, a versatile method is developed to form V-SWNT films on any substrate, lifting a major substrate-type limitation for aligned SWNTs.

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