

Abstract Submitted
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Why do carbon nanotubes grow chiral? EVGENI PENEV, VASILII ARTYUKHOV, BORIS YAKOBSON, Rice University, Houston, TX 77005 — Carbon nanotubes (CNT) hold enormous technological promise. It can turn into reality only if one can control in a practical way the CNT chirality—the geometric feature of the tubular carbon topology that governs the CNT electronic properties. Experimental efforts over the last decade have consistently revealed a puzzling strong preference towards specific chiral CNT grown via catalytic chemical vapor deposition, challenging any existing hypotheses and turning chirality control even more elusive. Here we investigate the roles of different factors in shaping the chirality distribution of CNT yield, including nanotube-catalyst interface [1], the energetic landscape of CNT caps [2], or growth kinetics [3], building upon our “Nanoreactor” framework developed for graphene synthesis [4]. Our theory shows promise in explaining narrow chirality distributions seen in multiple recent experimental studies.

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