Abstract Submitted
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GEC Student Award for Excellence Finalist: Plasma controlled adatom delivery and (re)distribution: enabling uninterrupted low temperature growth of ultra long vertically aligned carbon nanotubes EUGENE TAM, The University of Sydney, KOSTYA OSTRIKOV, CSIRO, PLASMA NANOSCIENCE TEAM — Vertically Aligned Single Wall Carbon Nanotubes (VASWCNTs) are of intense research interest, particularly in nanoelectronics. A major obstacle for VASWCNTs is the limited lengths in which they can be grown. The growth of surface bound VASWCNTs seems to halts after their maximum length is reached, a phenomena that is commonly attributed to catalyst poisoning. In addition, VASWCNTs generally require very high temperatures and thus the growth of the VASWCNTs is usually performed by separate intermediate steps before attachment to any device. Some experiments have shown that it is possible to grow VASWCNTs at sub 500 $^\circ$C and all have been done in plasma environments. We present the results that uses a Monte-Carlo technique to elucidate how plasmas affect the growth of VASWCNTs by controlling the precursor trajectories, substrate heating and changing surface activation and desorption energies. Here we show the precursor distribution along the surface is the primary cause for the VASWCNT growth to slow down and under the same gaseous and substrate conditions, VASWCNTs have a growth rate up to an order of magnitude higher than their neutral counter parts in plasma environments and allow for the growth of longer VASWCNTs.

Eugene Tam
The University of Sydney

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