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Synthesis and Investigation of Millimeter-Scale Vertically Aligned Boron Nitride Nanotube Arrays ROLAND TAY, HONGLING LI, SIU HON TSANG, LIN JING, DUNLIN TAN, EDWIN HANG TONG TEO, Nanyang Tech Univ — Boron nitride nanotubes (BNNTs) have shown potential in a wide range of applications due to their superior properties such as exceptionally high mechanical strength, excellent chemical and thermal stabilities. However, previously reported methods to date only produced BNNTs with limited length/density and insufficient yield at high temperatures. Here we present a facile and effective two-step synthesis route involving template-assisted chemical vapor deposition at a relatively low temperature of 900 degree C and subsequent annealing process to fabricate vertically aligned (VA) BN coated carbon nanotube (VA-BN/CNT) and VA-BNNT arrays. By using this method, we achieve the longest VA-BN/CNTs and VA-BNNTs to date with lengths of over millimeters (exceeding two orders of magnitude longer than the previously reported length of VA-BNNTs). In addition, the morphology, chemical composition and microstructure of the resulting products, as well as the mechanism of coating process are systematically investigated. This versatile BN coating technique and the synthesis of millimeter-scale BN/CNT and BNNT arrays pave a way for new applications especially where the aligned geometry of the NTs is essential such as for field-emission, interconnects and thermal management.

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