Researchers Grow Carbon Nanofibers U Without Toxic Ammonia

For Immediate Release

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Researchers from North Carolina State University have demonstrated nanofibers (VACNFs) can be manufactured using ambient air, making and less expensive. VACNFs hold promise for use in gene-delivery too technologies.

Conventional techniques for creating VACNFs rely on the use of ammonia gas, which is toxic. And while ammonia gas is not expensive, it ' s not free.

" This discovery makes VACNF manufacture safer and cheaper, because you don ' t need to account for the risks and costs associated with ammonia gas, " says Dr. Anatoli Melechko, an adjunct associate professor of materials science and engineering at NC State and senior author of a paper on the work. " This also raises the possibility of growing VACNFs on a much larger scale. "

In the most common method for VACNF manufacture, a substrate coated with nickel nanoparticles is placed in a vacuum chamber and heated to 700 degrees Celsius. The chamber is then filled with ammonia gas and either acetylene or acetone gas, which contain carbon. When a voltage is applied to the substrate and a corresponding anode in the chamber, the gas is ionized. This creates plasma that directs the nanofiber growth. The n atoms, which begin forming VACNFs beneath the nickel catalyst nano carbon forms on the nanoparticles it can pile up and clog the passage nanofibers.

Ammonia ' s role in this process is to keep carbon from forming a crus would prevent the formation of VACNFs.

" We didn ' t think we could grow VACNFs without ammonia or a hydr he tried anyway.

Melechko ' s team tried the conventional vacuum technique, using ac replaced the ammonia gas with ambient air – and it worked. The size

VACNFs were consistent with the VACNFs produced using convention

“We did this using the vacuum technique without ammonia,” Melech theoretical possibility of growing VACNFs without a vacuum chamber. be able to create VACNFs on a much larger scale.”

Melechko also highlights the role of two high school students involved and V. Varanasi, who are lead authors of the paper. “This discovery for their approach to the problem, which was free from any preconce think they ’re future materials engineers.”

The paper, “Aerosynthesis: Growth of Vertically-aligned Carbon Nanc published online in *Nanomaterials and Nanotechnology*. Co-authors in student Dr. R.C. Pearce; NC State Ph.D. student W.C. Wu; Dr. Josep of materials science and engineering at NC State; and D.K. Hensley a National Laboratory. The work was partially supported by National Sci 1056653.

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Note to Editors: The study abstract follows.

“Aerosynthesis: Growth of Vertically-aligned Carbon Nanofibres

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Abstract: Vertically-aligned carbon nanofibres (VACNFs) have been s acetone and air using catalytic DC plasma-enhanced chemical vapour or hydrogen is used as an etchant gas in the mixture to remove carb catalyst surface and impedes growth. Our demonstration of the use c up the possibility that ion etching could be sufficient to maintain the synthesis. It also demonstrates a path toward growing VACNFs in the