Scientists create new nanotube structures

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Thanks to the rising trend toward miniaturization, carbon nanotubes – which are about 100,000 times thinner than a human hair and possess several unique and very useful properties – have become the choice candidates for use as building blocks in nanosized electronic and mechanical devices. But it is precisely their infinitesimal dimensions, as well as their tendency to clump together, that make it difficult for scientists to manipulate nanotubes.

Dr. Ernesto Joselevich, together with Ph.D. student Ariel Ismach and former M.Sc. student Noam Geblinger of the Weizmann Institute's Materials and Interfaces Department, are developing techniques to coax carbon nanotubes to self-assemble into ordered structures – essentially making the nanotubes do the hard work for them.

An animated movie explaining nanotube serpentine formation:

Ironically, the universal principle of 'order through chaos,' has allowed the team's most recent research to give rise to nanotubes that are strikingly more ordered and complex than any ever observed before. These intriguing new nanotube structures, which the scientists have dubbed 'serpentines' due to their self-assembly into snake-like or looped configurations, have recently been reported in the cover article of the journal *Nature Nanotechnology*.

'It may seem paradoxical – trying to create order through chaos – but in fact, this a common phenomenon on the macroscale. Systems affected

by forces that fluctuate from one extreme to another tend to self-organize into much more complexly ordered structures than those in which the external forces are ‘calm.’ We applied this principle at the nanoscale to see if it would have the same effect, and indeed, it did,' says Joselevich.

Serpentines are a common geometry in many functional macroscale systems: antennas, radiators and cooling elements. Analogously, nanotube serpentines could find a wide range of nano-device applications, such as cooling elements for electronic circuits and opto-electronic devices, as well as in power-generating, single-molecule dynamos. 'But the feature I find most intriguing about these serpentines,' says Joselevich, 'is their beauty.'

Source: Weizmann Institute of Science