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Bulk Synthesis of Helical Coiled Carbon Nanostructures WEI WANG, Department of Physics and Astronomy, Clemson University, Clemson, SC, 29634, APPARAO RAO, Department of Physics and Astronomy, Clemson University, Clemson, SC, 29634, CLEMSON UNIVERSITY TEAM — We report a bulk process for preparing helical coiled carbon nanostructures including coiled nanowires and coiled nanotubes on bare quartz substrates. These nanostructures were synthesized at ambient pressure using a thermal chemical vaporization deposition (CVD) process in which xylene and acetylene were used as the primary carbon source. A multi-metal catalyst formed from a mixture of ferrocene and indium isopropoxide served as the seed to initiate the growth of these helical coiled nanostructures. Importantly, no pre-formed substrates are required in our process. The as-synthesized coiled nanowires and nanotubes are pure without the presence of amorphous carbon nanoparticles. Further, by precisely controlling the atomic ratio of In/(Fe+In), coiled nanowires or coiled nanotubes can be synthesized exclusively. The diameters of the as-grown coiled nanowires vary from several tens to several hundreds nanometers, whereas the diameters of the coiled nanotubes are around 20 nm. Structural, electrical and mechanical properties of these nanostructures revealed using SEM, TEM, HR-TEM and AFM. will be presented.

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