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Synthesis and high temperature stability of amorphous Si(B)CN-MWCNT composite nanowires ROMIL BHANDAVAT, GURPREET SINGH, Kansas State University — We demonstrate synthesis of a hybrid nanowire structure consisting of an amorphous polymer-derived silicon boron-carbonitride (Si-B-C-N) shell with a multiwalled carbon nanotube core. This was achieved through a novel process involving preparation of a boron-modified liquid polymeric precursor through a reaction of trimethyl borate and polyureasilazane under atmospheric conditions; followed by conversion of polymer to glass-ceramic on carbon nanotube surfaces through controlled heating. Chemical structure of the polymer was studied by liquid-NMR while evolution of various ceramic phases was studied by Raman spectroscopy, solid-NMR, Fourier transform infrared and X-ray photoelectron spectroscopy. Electron microscopy and X-ray diffraction confirms presence of amorphous Si(B)CN coating on individual nanotubes for all specimen processed below 1400 degree C. Thermogravimetric analysis, followed by TEM revealed high temperature stability of the carbon nanotube core in flowing air up to 1300 degree C.

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