Benzene-Derived Carbon Nanothreads

Scientific Achievement
Synthesis of a new carbon nanomaterial from benzene under pressure that is the thinnest possible thread of the diamond structure

Significance and Impact
These sp³ nanothreads should have diverse applications owing to their unique properties, including strength, compared to conventional sp² carbon nanotubes

Research Details
• Slow compression/decompression of benzene allows recovery to ambient pressure of carbon nanothreads capped by hydrogen.
• Threads were characterized by synchrotron x-ray diffraction, neutron diffraction, TEM, Raman spectroscopy, NMR, and first principles calculations made possible by the Efree ERFC.

Facilities: SNS, Oak Ridge; APS, Argonne