Superconducting Boron Nanostructures

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**Description:**

A process for growth of boron-based nanostructures, such as nanotubes and nanowires, with a controlled diameter and with controlled chemical (such as composition, doping) as well as physical (such as electrical and superconducting) properties is described. The boron nanostructures are grown on a metal-substituted MCM-41 template with pores having a uniform pore diameter of less than approximately 4 nm, and can be doped with a Group Ia or Group Ila electron donor element during or after growth of the nanostructure. Preliminary data based on magnetic susceptibility measurements suggest that Mg-doped boron nanotubes have a superconducting transition temperature on the order of 100 K.

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