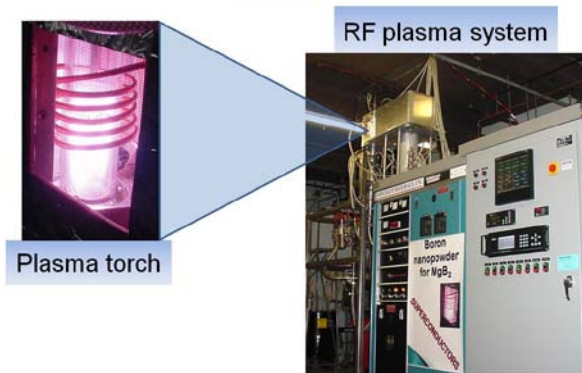


# BORON NANOPOWDER

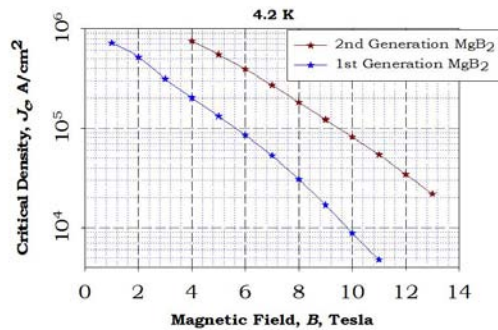
## Boron Nanopowder for Conversion to Magnesium Diboride and use as a Superconducting Material

Specialty Materials, Inc. has developed a plasma synthesis process for the production of nano-sized boron powder. Boron trichloride ( $\text{BCl}_3$ ) and hydrogen are directly injected into an RF plasma to produce boron nanopowder. The gas phase synthesis and *in situ* doping result in controlled purity boron powder. Magnesium diboride ( $\text{MgB}_2$ ) superconducting powder-in-tube wire made with Specialty Materials doped boron nanopowder has shown enhanced superconducting properties. The plasma synthesis process is currently in scale-up. Sample quantities of undoped and carbon-doped boron nanopowder are now being made available.

### SMI's pilot plasma synthesis system

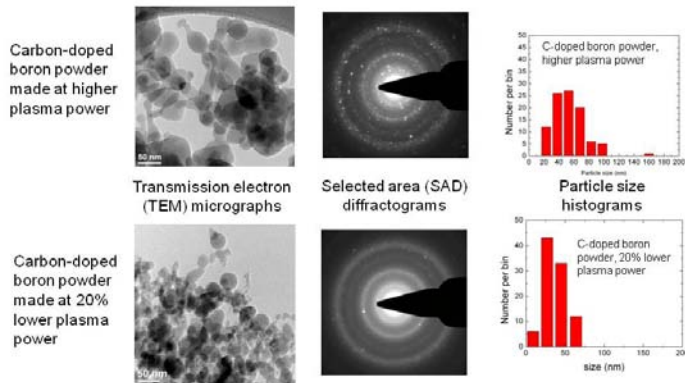


### 2<sup>nd</sup> Generation $\text{MgB}_2$ – breakthrough in wire technology



2<sup>nd</sup> generation  $\text{MgB}_2$  superconducting wire made with SMI boron powder displays that highest critical current densities,  $J_c$ , thus far reported

### Plasma synthesized boron powder



The plasma process for boron powder results in nano-sized particles with a mixture of amorphous and crystalline phases. Lower plasma power results in smaller particles and a higher fraction of amorphous phase

Figures clockwise from the upper left show a diagram of the boron powder plasma synthesis pilot system, the critical current performance of a superconducting  $\text{MgB}_2$  wire made from carbon-doped SMI boron powder, a TEM micrograph of SMI boron powder, and a histogram of particle sizes.

Pricing is available on our website at [www.specmaterials.com](http://www.specmaterials.com).

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Manufacturers of Boron and SCS Silicon Carbide Fibers and Boron Nanopowder