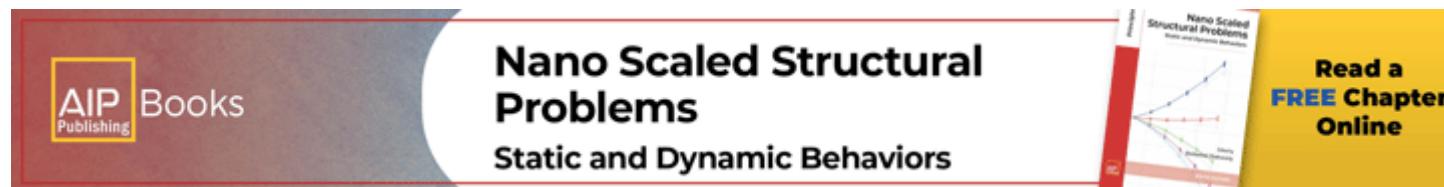


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10 to 25-fold increase in the transport superconducting critical current density of spark-plasma sintered Bi-2223 superconductors

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ABSTRACT

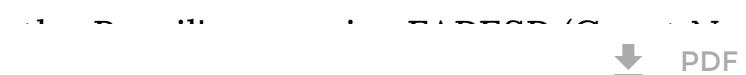
Pre-reacted powders of $(\text{Bi-Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10+\delta}$ (Bi-2223) were consolidated by using the spark plasma sintering (SPS) technique under vacuum and at two



shell morphology, where the shell is oxygen deficient. A post-annealing heat treatment (PAHT), performed in air, at 750 °C, and for a brief time interval, is responsible for a 10 to 25-fold increase in the transport superconducting current density at 77 K. The role of the oxygen-deficient shell, before and after the PAHT, was investigated by means of magnetic and transport measurements. We argue that the PAHT is two folds: (i) it is responsible for the decrease of the width of the oxygen-deficient shell, then increasing the oxygen content along the grain boundaries; (ii) it promotes the formation of conduction current paths along the grain boundaries of the SPS material.

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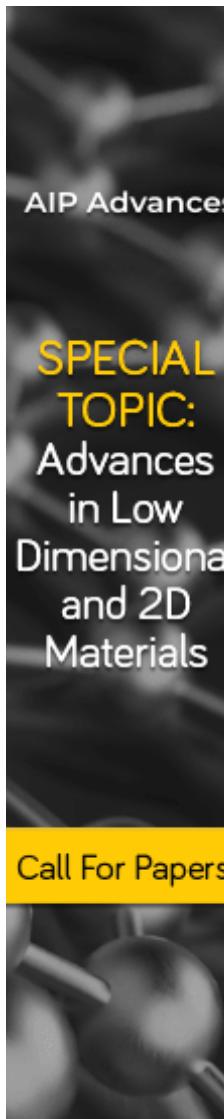


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