

## **Superconducting transport properties of 2.2-GeV Au-ion irradiated *c*-axis twist $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ bicrystals**

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2.2-GeV Au-ions irradiation is used to study the effect of columnar defects on the transport properties of  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$  (Bi2212) bicrystals with high quality *c*-axis twist grain boundary. The studies show a similar increase in the irreversible temperature determined within the single crystals and across the grain boundaries after irradiation. However, the irradiation enhancement on the grain boundary critical current ( $I_c$ ) at low temperatures is small, compared to the more than an order of magnitude increase of single crystal  $I_c$ .