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Bulk Growth of $YBa_2Cu_3O_{7-\delta}$ Superconductors with Enhanced Flux Pinning JODI-ANN MCLEAN, MATTHEW C. SULLIVAN, JANET HUNTING, Ithaca College — We present our work on the bulk growth of $YBa_2Cu_3O_{7-\delta}$ (Y-123) superconductors with enhanced flux pinning abilities grown using the melt textured growth method. Polycrystalline precursor materials of superconducting Y-123 and insulating Y_2BaCuO_5 (Y-211) are synthesized by sintering commercially available Y_2O_3, CuO, and $BaCO_3$. This process is repeated multiple times to improve the purity and crystal structure of the precursors. In order to make a superconductor with enhanced flux-pinning, it is necessary to add insulating Y-211 impurities to act as pinning centers to the bulk Y-123 superconductor, heat the mixture to temperatures that liquefy the superconducting phase, then cool the mixture slowly to crystallize the superconducting phase. Afterwards we anneal the enhanced flux-pinning superconductor in oxygen to restore oxygen content that was removed during the firing process. We present data on the crystal structure of the precursor materials (Y-123 and Y-211)) and the superconducting transition temperature of the precursor Y-123. In addition, we present data on the transition temperatures and the flux pinning forces of the enhanced flux-pinning superconductors.

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