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Optimizing Production of Superconducting Bulk YBCO Crystals: Effects of Initial Temperature and Growth Time[1] ERIN JOLLEY, CONNOR SHEA, JANET HUNTING, M.C. SULLIVAN, Ithaca College — We present our work on increasing both pinning force and critical temperature of bulk YBCO superconducting crystals. We optimized temperature profiles for growing bulk YBaCuO superconductors by varying (a) temperature and (b) growth time. We synthesize the precursor materials, superconducting $Y_1Ba_2Cu_3O_7$ (Y-123) and non-superconducting $Y_2Ba_1Cu_1O_5$ (Y-211), and mix the two in a 1:0.4 molar ratio before beginning melt textured growth. We heat the mixture to a temperature above the melting point of Y-123 but below the melting point of Y-211, where it is held until the Y-123 melts and the Y-211 impurities disperse in the mixture. The mixture is then quickly cooled to an initial temperature (a) near the peritectic point, and is then slowly cooled for 30-100 hours (b) to allow steady growth of large domain Y-123 crystals. We will discuss the effects of different initial temperatures near the peritectic point and growth times on the pinning force and critical temperature of these samples.

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