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A Model Approach to Flux-Pinning Properties of YBCO Vortex States via Non-Superconducting Impurities RONALD GAMBLE, KLINTON DAVIS, ABEBE KEBEDE, North Carolina A&T State Univ — Thin film YBCO samples with added non-superconducting nanodot defects of CeOand BaSnOare the focus of recent high-temperature superconductor studies. Examining the structure shows that quantized magnetic flux vortices from within the sample arrange themselves in a self-assembled lattice. The nanodots, with non-superconducting properties, serve to present structural properties to restrict motion of these vorticies under a *pinning-force*and to enhance the critical current density. A formulation of a new model for the system by a variation in the electron pair velocity via the virtual work from the nanodot defects in accordance to the well-known Superconductivity theories is tested. A solution to the expression for the magnetic flux, zero net force and pair velocity will generate a setting for the optimal deposition parameters of number density, growth geometry and mass density of these nanodot structures. With a calculation of pair velocities from a similar work, a comparison is made between experimental and theoretical velocity calculations using growth geometry and chemical potential. This will yield insight into how the current density for a doped high-temperature superconductor will be modified and tuned based on the density of the nanodots themselves.

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