

Ion-velocity dependence of high-density electronic excitation effects in oxide superconductors

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Thin films of $\text{EuBa}_2\text{Cu}_3\text{O}_y$ oxide superconductor have been irradiated with high energy heavy ions (80 MeV I, 125 MeV Br, 1.1 GeV Mo and 3.5 GeV Xe) having same electronic stopping power, S_e in order to investigate the ion-velocity dependence of the electronic excitation effects under the constant electronic energy deposition. Although S_e is constant, a strong reduction in the irradiation effect on lattice parameter with increasing ion-velocity is observed in the low ion-velocity region around $E \sim 1$ MeV/nucleon, while the ion-velocity dependence is hardly observed in the high ion-velocity region of $E > 10$ MeV/nucleon. If the observed velocity-dependence is assumed to be due to the change in the fraction of S_e contributing to defect creation, the fraction in the low velocity region ($E \sim 0.6$ MeV/nucleon) is estimated to be about two times larger than that in the high velocity region ($E > 10$ MeV/nucleon).