S_e-scaling of lattice parameter change in high ion-velocity region ($v \geqslant 2.6 \times 10^9$ cm/s) in ion-irradiated $EuBa_2Cu_3O_y$

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Swift heavy ions (^{35}Cl–^{238}U) with wide energy range of 80 MeV–3.84 GeV have been irradiated to $EuBa_2Cu_3O_y$ oxide superconductor films, and the lattice parameter change due to electronic excitation has been measured. In the high ion-velocity region ($v \geqslant 2.6 \times 10^9$ cm/s), the change in crystallographic *c*-axis lattice parameter per unit ion-fluence varies as the 4th power of S_e. However, in the low ion-velocity region ($v \leqslant 1.7 \times 10^9$ cm/s), the deviation from the 4th power dependence is observed. The S_e scaling in the high ion-velocity region cannot be explained by the thermal spike model that is based on a radial distribution of energy deposition by secondary electrons. The change in *c*-axis lattice parameter per unit ion-fluence varies as the 4th power of the primary-ionization rate, d*J*/d*x*, in the whole ion-velocity region. The result supports that the Coulomb explosion triggers the atomic displacements.