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Optimization of HighTc Josephson nanojunctions by Monte Carlo simulations M. SIRENA, N. BERGEAL, J. LESUEUR, ESPCI - LPQ; 75231 Paris, France, G. FAINI, LPN-CNRS, 91460 Marcoussis, France, R. BERNARD, J. BRIATICO, D. CRETE, UMR CNRS/THALES, 91120 Palaiseau, France — The fabrication of YBCO JJ by ion damage is the best method that allows closed packed JJ series within the nanoscale and that could operate at high temperature. However, the strong variation of the JJ's critical current with temperature (T) and the increase of dispersion for high irradiation dose are still important issues for several applications. Reproducible HTc JJ have been produced combining electron beam lithography and ion beam irradiation, whose characteristics can be adjusted on a wide range of T. To further improve the homogeneity of planar JJ and optimize their behaviour, we have studied its lateral ion damage distribution (LDD) for different ions and incident energies using Monte Carlo simulations. The LDD was used to calculate the transition temperature (Tc') of the irradiated zone and its resistance as a function of T. Dispersion in the irradiation mask's size was introduced as the source of the JJ's in-homogeneity. The simulations results reproduce quite well the observed dispersion of the irradiated JJ. A linear behaviour of the JJ's Tc' dispersion with basically the LDD width was found, independent of the incident ions mass, its energy, the films thickness, etc. By choosing the appropriate parameters is possible to increase the JJ homogeneity, reducing the LDD width.

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