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Dislocation pileup in He implanted complex oxides AVISHAI OFAN, Columbia University, LIHUA ZHANG, Brookhaven National Laboratory, OPHIR GAATHON, Columbia University, KENNETH EVANS-LUTTERODT, Brookhaven National Laboratory, SASHA BAKHRU, HASSARAM BAKHRU, SUNY Albany, DAVID WELCH, YIMEI ZHU, Brookhaven National Laboratory, RICHARD M. OSGOOD, JR., Columbia University — The origin of the anomalous high spatial selective etch rate in a 0.4 μm-wide buried deeply implant region in complex oxides is studied. $LiNbO_3$ samples, prepared with 10 μm implantation depth and 5x10^{16} cm^{-2} He^+ fluence, show wet-etch-rate enhancement of 10^4 occurs after implantation and a narrow window (175-275 °C) of low-temperature post-implantation annealing. Examination using time-resolved optical microscopy, XRD, and TEM show that this enhancement arises from the more rapid etch-solution transport in the highly dense network of dislocations pileups formed in the implanted region after annealing. Full curing of the dislocations takes place at 350 °C. A mechanism for the pileups build-up and disappearance is suggested.

Avishai Ofan
Columbia University

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