PROCESSING OF SUPERCONDUCTOR-NORMAL-SUPERCONDUCTOR JOSEPHSON EDGE JUNCTIONS

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Abstract

The electrical behavior of epitaxial **superconductor-normal-superconductor** (SNS) **Josephson edge junctions is strongly affected by processing conditions. E*x-situ* processes, utilizing photoresist and** polyimide/photoresist **mask layers, are employed for ion milling edges for junctions with Yttrium-Barium-Copper-Oxide** (YBCO) **electrodes and primarily Co-doped YBCO interlayers. We introduce a** polyimide **passivation layer below the photoresist milling mask, resulting in cleaner edges, lower contact resistance, and smaller device parameter spreads. Current-voltage characteristics are qualitatively consistent with the resistively-shunted junction model behavior expected of SNS devices. The variations of device resistance and critical-current on interlayer thickness are examined in order to understand the conduction path through the junctions. Resistance data are quantitatively consistent with quasi-2-dimensional conduction along the a-b planes. The decay of device critical current with interlayer thickness and temperature is qualitatively consistent with conventional proximity effect theory, but with anomalous decay lengths. We are also examining the systematic trends of the devices fabricated with the** polyimide **process as function of electrode thicknesses in addition to normal layer thickness and with a variety of normal interlayer materials.**