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Growth and characterization of epitaxial $Bi_2Sr_2CaCu_2O_{8+\delta}$ thin films for large-scale fabrication of Josephson plasma wave-based THz devices. YILMAZ SIMSEK, VITALII VLASKO-VLASOV, ALEXEI KOSHELEV, TIMOTHY BENSEMAN, IBRAHIM KESGIN, WAI-KWONG KWOK, ULRICH WELP, Argonne National Laboratory, SUPERCONDUCTIVITY AND MAGNETISM TEAM — Resonant plasma oscillations in arrays of intrinsic Josephson Junctions (IJJ) offer new compact devices for generation and sensing of the continuous wave radiation in the THz range. However, the development of microchips based on the IJJ technology requires the reliable growth of large high quality films of the layered high-T_c superconducting materials such as $Bi_2Sr_2CaCu_2O_{8+\delta}$ (BSCCO). We will discuss the growth of a few micron thick BSCCO films using liquid phase epitaxy (LPE) on different kinds of substrates. The LPE, based on the high temperature crystallization from a melt solution is a promising method to grow single-crystalline films. The crystalline structure, surface morphology and nominal composition of our BSCCO films were characterized by XRD, SEM and EDS. Their superconducting properties were tested by SQUID and 4-point resistivity measurements. The films have well aligned merged large crystallites and an onset superconducting temperature below 90K. We study the range of experimental conditions allowing to improve the structural and superconducting properties of the films for their future use in the THz chips.

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