

Growth of Epitaxial (001) YBa₂Cu₃O₇ Superconducting Thin Films on (001) Diamond Substrate.

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Largest operation characteristic frequencies in the terahertz frequency range in grain boundary HTS Josephson junctions were obtained on sapphire and NdGaO₃ bicrystals. In order to reach higher frequencies and lower losses, it is necessary to use substrate material with lower dielectric constants and low losses in far infrared region. Besides that it is necessary to have high thermal conductivity in order to avoid overheating that substantially affect performance at higher bias voltages about 10 mV corresponding to frequencies about 5 THz. One of the best candidates for such purposes is diamond. In the present work, as a first step in this direction, we present results of successful growth of epitaxial (001)YBa₂Cu₃O₇ thin film on (100) diamond substrate by pulse laser deposition method. To compensate difference in sizes of unit cells and in thermal expansions and to protect the interface from chemical reaction of YBaCuO with carbon, a double buffer layer of SrTiO₃ and CeO₂ was used. The superconducting films, grown up to thickness of 200nm, were smooth and particle free. The XRD study demonstrated film single orientation, including in a-b plane.