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Strain and strain relaxation analysis of superconducting $Ba(Fe_{0.92}Co_{0.08})_2As_2$ films on various substrates ARTEMIS RAFTI, Q.Y. LEI, M. GOLALIKHANI, W.K. WITHANAGE, J. QIU, M. HAMBE, Department of Physics, Temple University, F. WILLIAMS, Q. YANG, D. TEMPLE, Applied Research Center, Center for Materials Research. Norfolk State University, E.D. BAUER, F. RONNING, Q.X. JIA, Materials Physics and Applications, Los Alamos National Laboratory, X.F. WANG, X.H. CHEN, Hefei National Laboratory for Physical Sciences at Microscale and Department of Physics, University of Science and Technology of China, J.D. WEISS, E.E. HELLSTROM, Applied Superconductivity Center, National High Magnetic Field Laboratory, Florida State University, X.X. XI, Department of Physics, Temple University — We have grown high quality, optimally doped superconducting $Ba(Fe_{0.92}Co_{0.08})_2As_2$ films on $SrTiO_3$, (La, Sr)(Al, Ta)O_3, $LaAlO_3$, CaF_2 and BaF_2 substrates. The variation in lattice mismatch allows the study of epitaxial strain effects on the structural and transport properties of the films. Reciprocal space mapping has been employed for detailed strain and strain relaxation analysis of the $Ba(Fe_{0.92}Co_{0.08})_2As_2$ films on the different substrates. We observed large substrate dependant changes in both in plane and out of plane lattice parameters. Furthermore, the crystallinity of the grown films, the lattice constant and lattice volume evolution with strain and strain relaxation were investigated, revealing an epitaxial strain and strain relaxation dependence on the superconducting transition temperature.

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