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Elastic, structural and magnetic properties of $EuTi_{1-x}A_xO_3$ (A=Zr, Nb) LING LI, ZHILING DUN, University of Tennessee, JIAQIANG YAN, University of Tennessee and Oak Ridge National Laboratory, HAIDONG ZHOU, University of Tennessee and National High Magnetic Field Laboratory, Florida State University, DAVID MANDRUS, University of Tennessee and Oak Ridge National Laboratory, VEERLE KEPPENS, University of Tennessee, DEPT. OF MATERIALS SCIENCE AND ENGINEERING, UNIVERSITY OF TENNESSEE TEAM, DEPARTMENT OF PHYSICS AND ASTRONOMY, UNIVERSITY OF TENNESSEE TEAM, MATERIALS SCIENCE AND TECHNOLOGY DIVISION, OAK RIDGE NATIONAL LABORATORY TEAM — The elastic moduli as a function of temperature (280-380 K) and magnetic field (0-9T) for single crystal $EuTiO_3$ have been measured using resonant ultrasound spectroscopy (RUS). All the moduli show a sharp step-like softening upon the cubic-to-tetragonal transition at around 288K. We also present low-temperature XRD, magnetic susceptibility, and RUS results on polycrystalline $EuTi_{1-x}Zr_xO_3$ and $EuTi_{1-x}Nb_xO_3$ (x=0.015, 0.03 and 0.05). All of the compositions investigated present a cubic-to-tetragonal structural transition as temperature is lowered. Our results indicate that the transition temperature of the structural instability increases to higher temperatures with increasing Zr and Nb concentration in both solid-solutions, accompanied by the decrease of the antiferromagnetic transition temperature T_N. While the structural distortion in $EuTi_{1-x}Zr_xO_3$ is suppressed with increasing Zr doping, the magnitude of the structural distortion in $EuTi_{1-x}Nb_xO_3$ is not affected by Nb-doping. The differences between Zr and Nb as dopants are discussed.

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