Title:	Inhomogeneous superconductivity in high-density nonmagnetic cobalt in a polycrystalline Co film
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Abstract:	We report the observation of inhomogeneous superconductivity (ISC) in the recently discovered high-density nonmagnetic (NM) phase of Co in thin films below an onset temperature of 5.4 K in the absence of external magnetic field, via four-probe measurements of resistivity. Further, the point-contact spectroscopy studies also confirm superconductivity in this system. We attribute the observed ISC to the presence of nanoscale grains of high-density non-magnetic Co (FCC structure) in a thin film of conductive, normal Co (HCP structure) which is magnetic. Incomplete superconducting transition found in the bulk measurements suggests that the observed phenomenon is due to ISC of nanoscale grains of NM phase of Co. In addition, using first-principles density functional and BCS theoretical analysis of Co under hydrostatic and volume-preserving-biaxial strains, we demonstrate that superconducting of its NM phase increases anomalously with strain near its transformation to ferromagnetic phase, as a result of softening of N phonon due to strong electron-phonon coupling that is further enhanced with the biaxial strain.
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