Strain-induced continuous transition from Weak localization regime to Strong localization regime in La$_{0.3}$Nd$_{0.7}$NiO$_3$ films

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The electrical transport properties of La$_{0.3}$Nd$_{0.7}$NiO$_3$ films that has been grown by Pulsed laser deposition on LaAlO$_3$ (100), SrTiO$_3$ (100), and NdGaO$_3$ (100) single crystal substrates have been studied. We show that strain/strain inhomogeneity induced by the substrates can lead to a continuous transition from the weak localized regime to a strong localized regime and likelihood of occurrence of a non- Fermi liquid behaviour. We observed that the metallic state of a film under compressive strain shows the non- Fermi liquid behaviour while the film that experiences a tensile strain shows a metal-insulator transition and a Fermi liquid behaviour. The TEM analysis shows the strain inhomogeneity in the films. The disorder induced continuous transition has been proposed in the context of half-filled Anderson Hubbard model at a finite temperature where the quenched disorder is responsible for non-Fermi liquid scaling$^1$. It is likely that strain inhomogeneity and cationic disorder in such films acts as a quenched disorder.