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Strain induced relaxor behavior in $PbSc_{0.50}Nb_{0.25}Ta_{0.25}O_3$ thin films: A comparison with the nanoceramics MARGARITA CORREA, ASHOK KUMAR, RAM KATIYAR, University of Puerto Rico — A comparative studies of the microstructure, micro Raman spectroscopy and dielectric properties of $PbSc_{0.50}Nb_{0.25}Ta_{0.25}O_3$ (PSNT) thin films and ceramics were carried out over a wide range of temperature 100-520 K and frequency 100Hz to 1MHz. Microstructure of PSNT films revealed an in plane compressive strain whereas PSNT ceramics showed an average 10-15 nm size nanoordered regions. We observed a shift of 65 K in dielectric maxima temperature towards the lower temperature and frequency dispersion of the dielectric constant in PSNT films compare to bulk that does not exhibit relaxor behavior. We addressed this different dielectric response due to the in plane compressive strain in the films. Temperature dependent micro Raman spectroscopy revealed that the ferroelectric state in PSNT ceramics were accompanied by pronounced changes in both the lowest frequency F_{2g} and highest frequency A_{1g} modes. Micro Raman spectra of the thin films compared to nanoceramics showed shifting of the Raman modes to lower frequencies that confirms the strain state of the films. The in plane compressive strain, dipole arrangement and the size of nanoordered regions change the dielectric response of the PSNT films compare to nanoceramics.

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