Supplementary Materials

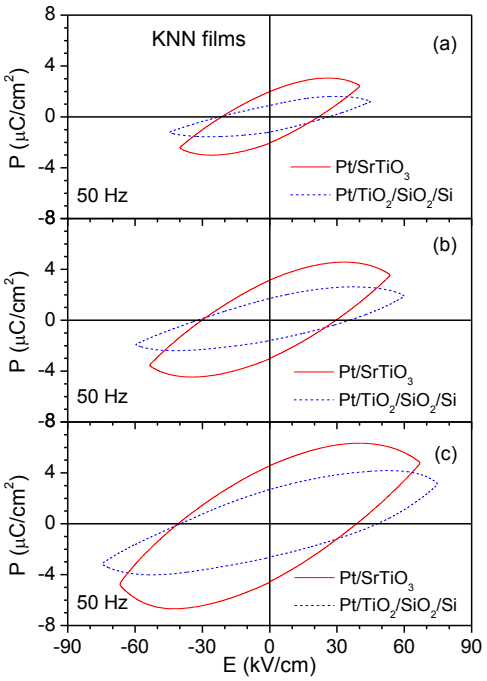

Figure S1. Polarization (*P*)-electric field (*E*) loops of KNN films deposited on $Pt/SrTiO_3$ (solid line) and $Pt/TiO_2/SiO_2/Si$ substrates (dash line) measured at room temperature and 50 Hz under electric field up to 45 (**a**), 60 (**b**) and 75 kV/cm (**c**).

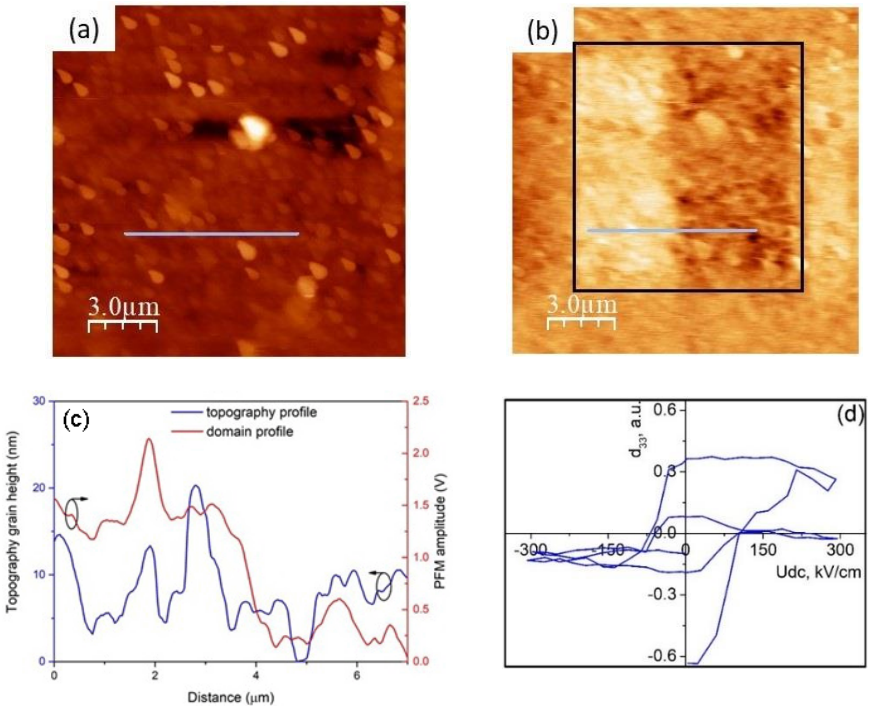

Figure S2. Topography (**a**), out-of-plane PFM signal (**b**), cross-section profile of topography and PFM amplitude (**c**) and local piezoelectric hysteresis loops (**d**) of KNN thin films deposited on $Pt/SrTiO_3$ substrates. No out-of-plane piezoresponse could be obtained for KNN films on $Pt/TiO_2/SiO_2/Si$ substrates.

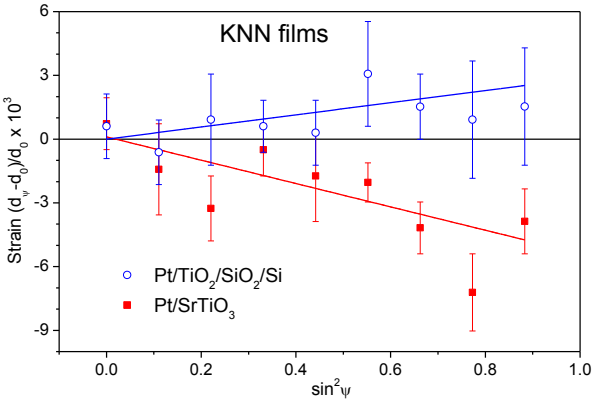

Figure S3. Strain $(d_\psi - d_0)/d_0$ of KNN films on Pt/TiO_2/SiO_2/Si (open circles) and Pt/$SrTiO_3$ substrates (solid squares) as a function of $\sin^2 \psi$ together with linear fits used for stress calculations at room temperature.