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Ferroelectricity in ultra-thin and thick ferroelectric films of $Pb_{0.35}Sr_{0.65}TiO_3$ studied by second harmonic generation[1] SHIWEI LIU, JACQUES CHAKHALIAN, MIN XIAO, Department of Physics, University of Arkansas, Fayetteville, Arkansas 72701, CHONGLIN CHEN, Department of Physics and Astronomy, University of Texas at San Antonio, San Antonio, Texas 78249
— Second harmonic generation (SHG) measurements were performed in the reflection geometry using the femtosecond Ti:Sapphire pulse laser at the wavelength of 810 nm for a 16-nm-thick ultra-thin $Pb_{0.35}Sr_{0.65}TiO_3$ film and a 243-nm-thick $Pb_{0.35}Sr_{0.65}TiO_3$ film, which were epitaxially deposited on (001) MgO substrates by pulsed laser ablation (PLD). It is concluded that in the ultra-thin film the ferroelectric phase is still present and a remarkably sharp ferroelectric phase transition was observed. In contrast, the thick film exhibits a pronounced diffuse phase transition. Theoretical analysis based on the polarization diagrams show the compensated c-domain fraction is dominant in both films whereas the nonlinear susceptibility of the ultra-thin film has a different tensor property from the thick film.

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