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**The Optical Bandgap of $Sr_{n+1}Ti_nO_{3n+1}$ ($n$=1∼5, 10) Ruddlesden-Popper Phases** CHEHUI LEE, Penn State Univ., NIKOLAS PODRAZA, XIAOXING XI, DARRELL SCHLOM — The $Sr_{n+1}Ti_nO_{3n+1}$ Ruddlesden-Popper homologous series is of particular interest because its n=∞ member $SrTiO_3$ exhibits such a wide range of properties including high dielectric constant, tunable dielectric constant, and superconductivity. In this study we explore the optical bandgaps of the $Sr_{n+1}Ti_nO_{3n+1}$ ($n$=1∼5, 10) Ruddlesden-Popper phases. This is the first time that a phase-pure $n$=10 Ruddlesden-Popper phase has ever been made. $Sr_{n+1}Ti_nO_{3n+1}$ ($n$=1∼5, 10) thin films were grown on (001) LSAT substrates by reactive molecular-beam epitaxy. (001) LSAT substrates provide good lattice match (< 1% mismatch) to the entire $Sr_{n+1}Ti_nO_{3n+1}$ series. For the $n$=10 sample, we also deposited it on (001) $SrTiO_3$ substrates. $SrTiO_3$ substrates provides nearly strain-free growth for the $n$=10 phase. The optical properties of the thin films were studied using *ex situ* spectroscopic ellipsometry. We measured the indirect bandgap of the $Sr_{n+1}Ti_nO_{3n+1}$ ($n$=1∼5, 10) Ruddlesden-Popper phases on LSAT and their values decrease monotonically from 3.48 eV ($n$=1) to 3.14 eV ($n = \infty$) with increasing $n$. The bandgaps of the $Sr_{n+1}Ti_nO_{3n+1}$ ($n$=1∼5, 10) Ruddlesden-Popper phases fall between the high bandgap SrO ($n$=0) and $SrTiO_3$ ($n = \infty$) end members of the series.

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