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Excitons at interfaces in thin oxide films NUWANJULA SAMARASINGHA , C. RODRIGUEZ, J. MOYA, N. FERNANDO, S. ZOLLNER, NMSU, P. PONATH, K. KORMONDY, A. DEMKOV, UT AUSTIN, D. PAL, A. MATHUR, A. SINGH, S. DUTTA, J. SINGHAL, S. CHATTOPADHYAY, IIT INDORE —
Using variable angle spectroscopic ellipsometry we explored the behavior of excitons at interfaces of ZnO and $SrTiO_3$ thin films in comparison with bulk GaP which has a much simpler band structure than wurtzite ZnO or perovskite $SrTiO_3$, but shows similar excitonic effects. The influence of excitonic effects on the dielectric function was characterized following Tanguy. We find that the real and imaginary parts of the dielectric function of thin $SrTiO_3$ layers on Si or Ge are much smaller than in the bulk and decrease monotonically with decreasing thickness due to the reduction of the dipole overlap matrix element. A similar effect can be seen for thin ZnO layers on Si as a function of thickness. On the other hand, the dominant absorption peak is larger in $SrTiO_3$ on a $LaAlO_3$ substrate than in bulk $SrTiO_3$ due to the increase of the dipole overlap matrix element.

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