

Abstract Submitted
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Weak localization effects in Al-doped ZnO films PRIYA.V CHINTA*, Q.Y. CHEN*, O. LOZANO*, P.V. WADEKAR*, W.K. CHU, Department of Physics and Texas Center for Superconductivity, University of Houston, TX, S.W. YEH, N.J. HO, Center for Nanoscience and Nanotechnology and Dept of Materials and Optoelectronic Engg, National Sun Yat-Sen University (NSYSU), Kaohsiung, Taiwan, L.W. TU, Y.S. CHANG, W.Y. PANG, I. LO, Center for Nanoscience and Nanotechnology and Dept of Physics, National Sun Yat-Sen University, Kaohsiung, Taiwan, H.W. SEO, Dept of Physics, University of Arkansas, AR — Metal-semiconductor transitions (MST) at low temperatures were studied for (0001)-oriented $Zn_{1-x}Al_xO$ thin films deposited by simultaneous RF magnetron sputtering of ZnO and Al onto (11-20)-oriented Al_2O_3 substrates. The MST occurs at 190K, 102K and 260K for $x=2\%$, 3% and 10% of Al-doping, respectively. The samples display negative magnetoresistance at low temperatures with zero-field electrical resistivity being as low as $3.3 \times 10^{-4} \Omega\text{-cm}$ for $x=3\%$. The charge scattering mechanisms below the MST will be discussed in light of weak localization and coulomb interactions due to disorder in the system. *Also with Dept of Physics, NSYSU, Taiwan.

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