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Epitaxial n-ZnO on p-Si with native SiOx reduced by Al buffer[1] C.F. CHANG, J.H. WANG, H.J. HUANG, Z.W. HUANG, P.V. WADEKAR, K.H. HUANG, C.W. LIN, J.J. LIN, S.C. SHENG, L.W. TU, S.W. YEH, N.J. HO, Q.Y. CHEN[2], National Sun Yat-Sen University, C.H. LIAO, R.O.C. Military Academy — RF sputtering was employed to deposit n-type zinc oxide epitaxial thin films on p-type silicon substrates to form p-i-n diodes. A buffer layer of crystalline metal oxide was introduced by redox reaction between an aluminum layer and the native SiO_2. The aluminum layer was sputtered to various thicknesses and then annealed in situ for different times. The epitaxial relations follow (111) $_{Si}$//(0001) $_{ZnO}$ and [110] $_{Si}$//[11$\bar{2}$0] $_{ZnO}$, though certain degree of mosaicity was observed wavering around the [11$\bar{2}$] $_{Si}$ axis. Cross-sectional TEM observations of the interfaces, x-ray crystallography via ω-2θ and rocking scans in regards to the perfection of the structures and orientations are agreeable. The current-voltage characteristics of the p-i-n diodes show promising outlooks for light emitting and photovoltaic applications.

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