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Epitaxial growth of zinc oxide thin films on silicon (100) substrates with zirconia buffer layer RAVI AGGARWAL, Department of Materials Science and Engineering, North Carolina State University, CHUNMING JIN, Joint Department of Biomedical Engineering, University of North Carolina, WEI WEI, JAGDISH NARAYAN, Department of Materials Science and Engineering, North Carolina State University, ROGER J. NARAYAN, Joint Department of Biomedical Engineering, University of North Carolina — As an II-VI semiconductor, with wide bandgap and high exciton binding energy, zinc oxide has been favored for the new opto-electronic devices. One of the key issues for such applications is the integration of the zinc oxide onto silicon substrates. In this paper, we report a new integration methodology for depositing high quality zinc oxide thin films on silicon substrates. We have developed a novel epitaxial system for this purpose. An yttria stabilized zirconia (YSZ) buffer layer was used for depositing high quality, single crystalline zinc oxide films on Si (100) substrates. The heterostructure was developed with a pulsed laser deposition system. The results show that ZnO films grow epitaxially on YSZ buffered Si (100) substrates, with c-axis perpendicular to the substrate surface. High resolution image demonstrated that the interface between YSZ and ZnO is atomically smooth without any evidence of reaction. These zinc oxide films on Si (100), with YSZ buffer, showed excellent photoluminescence, evidenced with an extremely high exciton emission centered at 377 nm, at room temperature.

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