

Abstract Submitted
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Growth and Structure of ZrSiN Thin Films ROBERT LAD, XUEFEI ZHANG, University of Maine — A series of $Zr_{1-x}Si_xN$ thin films were grown on r-plane sapphire substrates using rf magnetron co-sputtering of Zr and Si targets in a N_2/Ar plasma. The films were grown at $200^\circ C$ and also post-deposition annealed to $900^\circ C$ in vacuum. Pure ZrN grows with high quality (100) epitaxy on r-sapphire as demonstrated by x-ray diffraction reflectivity and pole figure analysis. When small amounts of Si are added into the lattice, the films become strained as evidenced by a continual increase in the lattice parameter (up to a 6% for $x=0.12$) and become polycrystalline. Higher amounts of Si cause the structure to become amorphous and the films become much rougher. X-ray photoelectron spectroscopy measurements show large shape changes in the N and Zr core levels as the alloy composition changes, whereas the Si peaks exhibit negligible change. UV-visible optical absorption measurements show a direct correlation between the location of the absorption edge and Zr-Si ratio.

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