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X-Ray Absorption Spectroscopy Study of Iron Silicon Germanide and Osmium Silicide Epitaxial Films[1] NADER ELMARHOUMI, RYAN COTTIER, FATIMA AMIR, Univ. of North Texas, GREGORY MERCHAN, AMITAVA ROY, CAMD/LSU, HEIKE GEISLER, TERRY GOLDING, CARL VENTRICE, Texas State Univ. — Some of the iron- and osmium-based metal silicide and germinide phases have been predicted to be direct band gap semiconductors. Therefore, they show promise for use as optoelectronic materials. We have used synchrotron-based x-ray absorption spectroscopy to study the structure of iron silicon germanide and osmium silicide films grown by molecular beam epitaxy. Osmium silicide films which are primarily in the Os_2Si_3 phase and a series of $Fe(Si_{1-x}Ge_x)_2$ films with a nominal Ge concentration of up to x = 0.04 have been grown. X-ray absorption near edge structure (XANES) measurements on both the iron silicon germinide and osmium silicide films has been performed. An absorption edge shift of 0.9 eV is observed for the osmium silicide films; however, no shift was observed for the iron silicon germinide films. Extended x-ray absorption fine structure (EXAFS) measurements have also been performed on the iron silicon germinide films. The nearest neighbor coordination corresponding to the β-FeSi phase of iron silicide provides the best fit with the EXAFS data.

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