Project Objectives

Goal: Characterize Properties of M-S Contacts
- Determine Al/Si Ratio Across Deposition Methods
  - Measure with XPS and SIMS
- Characterize Physical Properties of the Films
  - Image Sintered Films, Relate to Al/Si Content
- Examine TLM and Diode Characteristics
  - Relate to Al/Si Content and Diode Dimensions

Motivation

- Previous work in the RIT SMFL found defects in Flash Evaporated AlSi Films post 450°C Sinter, hypothesized to be Junction Spiking due to a Silicon-starved deposition
- AlSi Films Deposited via the CVC 601 DC Sputter system had junction spiking due to a Silicon-starved deposition, hypothesized to be due to a Silicon-rich deposition

Chemical Analysis of Al Depositions

- The AlSi Films will be Analyzed with X-ray Photoelectron Spectroscopy (XPS) and Secondary Ion Mass Spectrometry (SIMS)
- These methods can provide the Al:Si ratios, the results of which can be related to the electrical and physical results of this study

XPS Results

- Surface Plasmon Peaks from the Al interfere with the Si Signal

Physical Results

- The Defect Found in the Flash Evaporator is likely not Junction Spiking, but may be a function of the Silicon content in the deposited AlSi Film
- Upon Etching the Al, the roughness pattern remained
- The roughness presented itself as particles left on the surface, not pits from Junction Spiking

Electrical Results

- The Sinter had a major effect on every diode’s I-V characteristic

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Conclusions

- The Defect Found in the Flash Evaporator is likely not Junction Spiking, but may be a function of the Silicon content in the deposited AlSi Film

Future Work

- Fabricate functional TLM structures to examine Contact Resistances of the films
- Use SIMS or Auger analysis to quantify the Silicon Content within the AlSi films
- Use EDS to determine the chemical makeup of the residue left on the surface

References

(3) http://jebcs.physik.uni-saarland.de/
(4) https://www.researchgate.net/