

# SAIP2014



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## **X-ray reflectometry and Surface Brillouin scattering studies of thin films of VC deposited on Si by RF magnetron sputtering**

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### **Abstract :**

VC has high hardness, a high melting point and chemical stability which makes it useful as a thin protective coating. Thin films have been deposited with varying layer thicknesses and RF powers on a (100) Si wafer using RF magnetron sputtering at working gas pressures of  $4 \times 10^{-3}$  mbar. The substrate was placed 50 mm from the target and initially plasma etched before the deposition of the vanadium carbide film. Varying the deposition time and RF power produces films of different thicknesses, stoichiometry and microstructures. X-ray reflectometry (XRR) was then used to determine the layer thicknesses, roughness and density of the deposited layers. The layer thickness and density are used as input parameters in calculations that are carried out after surface Brillouin scattering (SBS) experiments in order to determine the elastic stiffnesses of VC thin films. SBS is a non-destructive technique that uses a tandem Fabry-Perot interferometer to measure the frequency shift in laser light scattered from the sample due to the propagation of surface acoustic waves. The results presented show that the VC/Si system consists of an elastically harder layer (VC) on a softer substrate (Si) since the Sezawa modes characteristic of a soft on hard system were not observed. In order to observe the Sezawa modes together with the Rayleigh mode and thus allow the elastic constants to be determined using computational methods, the growth of the VC films on a substrate elastically harder the films such as SiC is in progress.

### **Award :**

Yes

### **Level :**

PhD

### **Supervisor :**

J. D. Comins, Darrell.Comins@wits.ac.za University of the Witwatersrand

### **Paper :**

No

**Primary authors :** Mr. JAKATA, Kudakwashe (University of the Witwatersrand)

**Co-authors :** Prof. COMINS, Darrell (University of the Witwatersrand) ; Dr. MSIMANGA, Mandla (iThemba Labs(Gauteng)) ; Dr. WAMWANGI, Daniel (University of the Witwatersrand)

**Presenter :** Mr. JAKATA, Kudakwashe (University of the Witwatersrand)

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