

Contribution ID: 51

Type: Poster Presentations

## Interfacial reactions and surface analysis of W thin film on 6H-SiC

Tuesday, 17 November 2015 18:34 (2 minutes)

Tungsten (W) thin film was deposited on bulk single crystalline 6H-SiC substrate and annealed in H2 and Ar ambient at temperatures ranging from 700 to 1000 °C for 1 hour. The resulting solid-state reactions, phase composition and surface morphology were investigated by Rutherford backscattering spectroscopy (RBS), grazing incidence X-ray diffraction (GIXRD) and scanning electron microscopy (SEM) analysis techniques. As-deposited RBS results indicate the presence of W and O<sub>2</sub> in the deposited thin film, the XRD showed the presence of W, WO<sub>3</sub>, W<sub>5</sub>Si<sub>3</sub> and WC. RBS results indicated the interaction between W and SiC accompanied by the removal of oxygen at 700 °C for the samples annealed in H<sub>2</sub> ambient. The XRD analysis indicated the presences of W<sub>5</sub>Si<sub>3</sub> and WC in the samples annealed at 700 °C. At temperatures of 800 °C, 900 °C and 1000 °C, W further reacted with the SiC substrate and formed mixed layer containing silicide phases and a carbide phase. That is, W<sub>5</sub>Si<sub>3</sub>, WSi<sub>2</sub> and WC for the Ar ambient and W<sub>5</sub>Si<sub>3</sub>, WSi<sub>2</sub>, WC and W<sub>2</sub>C for H<sub>2</sub> ambient. The SEM micrographs of the asdeposited samples indicated the W thin film had a uniform surface with small grains. Annealing at 800°C led to the agglomeration of W grains into clusters for the H<sub>2</sub> annealed samples. SEM micrographs of the Ar annealed samples at 800 °C indicated randomly orientated large crystals growing on top of each other on the surface.

Primary author: Ms THABETHE, Thabsile (University of pretoria)

**Co-authors:** Dr NJORONGE, Eric (University of pretoria); Dr HLATSHWAYO, Thulani (University of Pretoria); Mr NTSOANE, Tshepo (Nuclear Energy Corporation of South Africa (NECSA))

Presenter: Ms THABETHE, Thabsile (University of pretoria)

Session Classification: Poster Session

Track Classification: Main