Contribution ID: **227** Type: **Poster Presentation**

Physical properties of Cr₇₈Al₂₂ thin films

Tuesday, 30 June 2015 16:10 (1h 50m)

Abstract content
   (Max 300 words)
Formatting &
Special chars

The Cr_{100-x}Al_x alloy system shows astonishing behaviour at higher Al concentrations [1]. Very high Néel temperatures (TN>800 K) are observed in samples with x>20. The SDW amplitude for these alloys are also larger than in other Cr alloy systems. In addition both the Hall coefficient and the resistivity for samples in the concentration range 15≤x≤25 is large. In this concentration range the resistivity have a negative temperature dependence and is in form characteristic of that of narrow-gap semiconductors [1]. Combining these unique bulk characteristics with exceptional thin film properties seen for Cr and its alloys [2], appears to be a way forward in order to improve modern technologies. For this reason the present study focus on Cr₇₈Al₂₂ thin films in a thickness (t) range 12 to 400nm, prepared on MgO(100), MgO(110) and fused silica substrates, prepared by DC magnetron sputtering. AFM results on the fused silica samples indicate interesting growth patterns with cubic structures forming in the thicker samples. This is supported by XRD results indicating that for the samples prepared on fused silica substrates preferred Cr(110) growth occurs for t≥100nm. XRD results also show good epitaxial growth of the films prepared on the MgO substrates. Resistance (R) as function of temperature investigations were done using the standard four-point probe method in a temperature range T<400K and show negative temperature dependence. Interestingly, the behaviour of R(T) differ for those samples prepared on MgO(100), as the film with t=400nm shows metallic characteristics.

[1] E Fawcett, HL Alberts, VY Galkin, DR Noakes and JV Yakhmi, Rev. Mod. Phys. 66 (1994) 25

[2] HJ Zabel, J. Phys.: Condens. Matter 11 (1999) 9380

Apply to be
 considered for a student
   award (Yes / No)?

no

Level for award
 (Hons, MSc,
   PhD, N/A)?

none

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

Please indicate whether
this abstract may be
published online
(Yes / No)

Yes

Primary author: Prof. PRINSLOO, Aletta (University of Johannesburg)

Co-authors: Dr SHEPPARD, Charles (Department of Physics, University of Johannesburg); Prof. FULLERTON, Eric (University of California San Diego); Ms DERRETT, Helen (University of Johannesburg); Dr VAN DEN BERG, Nic (University of Pretoria)

Presenter: Prof. PRINSLOO, Aletta (University of Johannesburg)

Session Classification: Poster1

Track Classification: Track A - Division for Physics of Condensed Matter and Materials