

Using the Hiden EQS Quadrupole Mass and Energy Analyser fast neutrals have been successfully detected. Energy scans have also been performed to calculate the speed of the neutrals.

Introduction

An area related to Secondary Ion Mass Spectrometry, SIMS, which is gaining more interest, is Secondary Neutral Mass Spectrometry, SNMS.

The Hiden IG20 ion gun was set-up perpendicular to the target of a tantalum substrate. The Hiden EQS was set-up at an acute angle, to gather the secondary species. This can be seen in Figure 1.

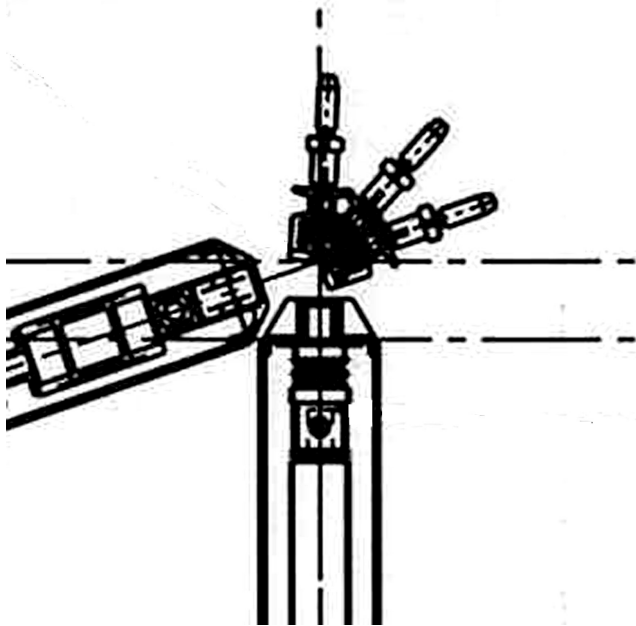


Figure 1: Experimental set-up

The distance from the IG20 ion gun to the tantalum sample was set at 25mm. The distance from EQS analyser to the tantalum sample as set at 20mm.

The ion gun beam was argon at 5keV energy. At the aperture of the analyser, the extractor voltage was set to a high positive voltage, to reject positive ion. The filaments were on to ionise neutrals entering the analyser. Detection was set for monitoring the energy of the tantalum 181 amu signal.

Manufactured in England by:

Figure 2 shows the scan with beam off but filaments on. This equates to the background signal. It is approximately 10 counts per second. NB a count rate of 1 c/s \equiv $\sim 1 \times 10^{-3}$ mbar of neutral gas pressure.

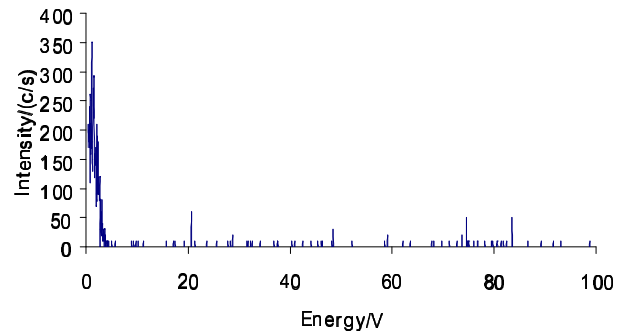


Figure 2: Background scan, beam off, filaments on

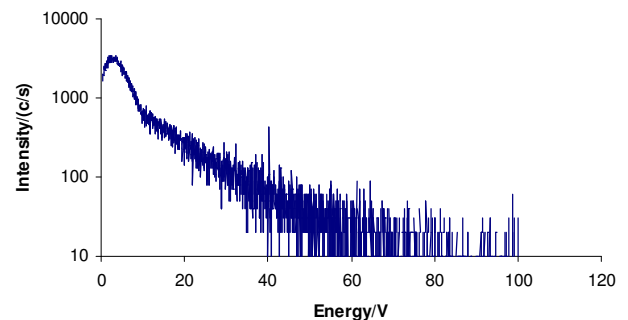


Figure 3: Signal scan, beam on, filaments on

Figure 3 therefore shows the signal with beam on and filaments on, but only about 10 counts, i.e. having taken the background level into account. The signal level is approximately 50eV, which corresponds to a velocity of 7269 m/s.

Conclusions

- Fast Neutrals can be analysed using the Hiden EQS system, up to ~ 50 eV
- Calculations for velocity can be performed.