Plasma Consult

2.45 GHz Microwave Plasma Source SLAN I-DS

Fig. 1: SLAN I-DS

Application of the ECR slot antenna plasma source for ion implantation

3rd International Workshop on Plasma-Based Ion Implantation

The work described below was performed using a PlasmaConsult SLAN-I-DS microwave plasma source.

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Application of the ECR slot antenna plasma source for ion implantation

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Abstract

The electron cyclotron resonance version of the slot antenna microwave plasma source SLAN I was used with an impulse implantation (PSII) system. Silicon substrates with a diameter of 2 cm were placed at a distance of 21 cm downstream from the source center, and have been implanted with nitrogen ions. At this position the ion concentration measured with a double Langmuir probe is 1.3×10^{10} ions cm^{-3}. The substrate holder was biased with 30 µs pulses of voltage from 25 to 40 kV. Typical pulse number per implantation was 34000. The plasma source was operated with 800 W microwave power (2.45 GHz) at a pressure of 0.1 Pa, with a flow of 24 sccm of pure nitrogen. The results of silicon surface examination are presented. Secondary ion mass spectrometry (SIMS) profiles were used to compare the dose and projected range of nitrogen, oxygen and carbon. With increasing pulse voltage not only the projected range but also the nitrogen dose increases. This is in agreement with the theoretical model. With Auger electron spectroscopy (AES), nitrogen, oxygen and carbon have been detected at the surface of the implanted substrates. The sources of contamination are discussed.

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APPLICATION NOTE

SLAN I-DS