Quantemol-D/HPEM example 3: Argon capacitively-coupled plasma (CCP) with Monte Carlo Simulation (MCS)

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Here we consider a capacitively-coupled plasma (CCP) using a Monte Carlo treatment of the electrons. The version of HPEM underlying Quantemol-D is that of March 2011 ("mar11").

The details of the calculation are shown in Table 1.

Excitation type	Inductive
Pressure	100 mTorr
ICP Power	300 Watt
Electron treatment	Monte Carlo
Flow rate	300 sccm

Table 1: Settings for Ar CCP example.

The simulation chamber is the same as in Example 2, and is shown in Figure 1. As for the inductively-coupled plasma (ICP) in Example 1, the wafer is coloured red in the diagram. This time however there are no coils. The gases enter the chamber through the purple area at the top. The yellow stand upon which the wafer sits is powered with an RF bias of amplitude 300 V, frequency 10 MHz.

The distributions of ions arriving at the wafer as a function of the incident angle and energy are shown in Figure 2.

Comparing the distributions of ions arriving at the surface obtained from the simu-

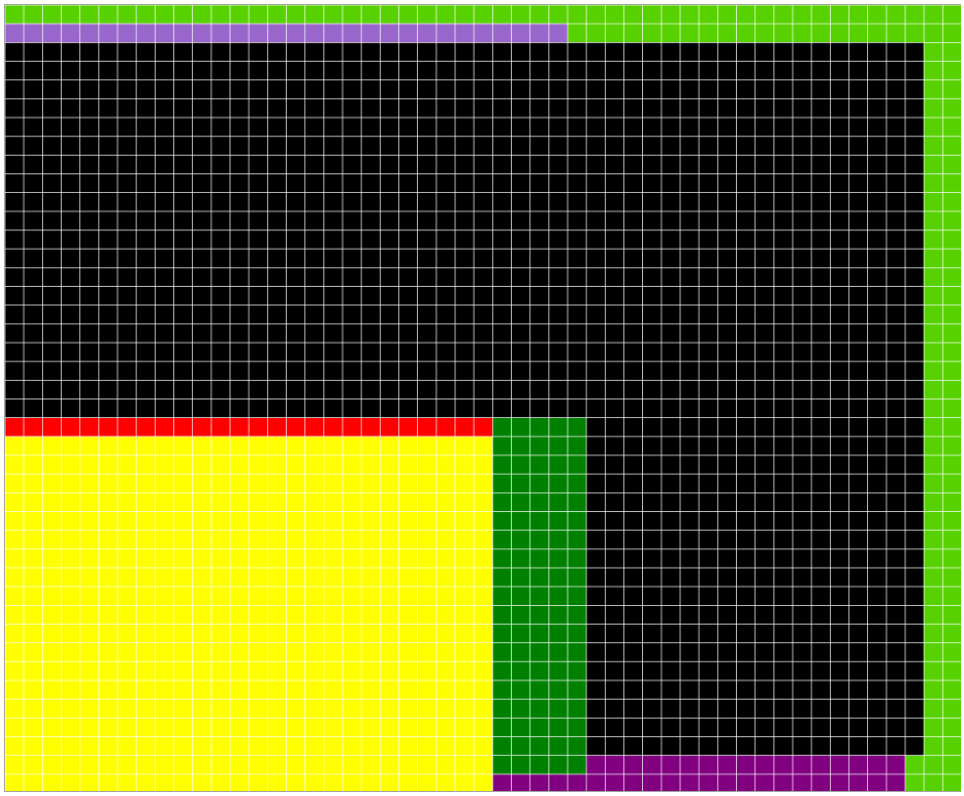

Figure 1: Model for Ar CCP plasma chamber.

lations using the Boltzmann treatment of the electrons (Example 2), and the Monte Carlo treatment (Figure 2), it can be seen that in both cases, the distribution has two peaks. In the latter case, the upper peak is moved to significantly higher energies.

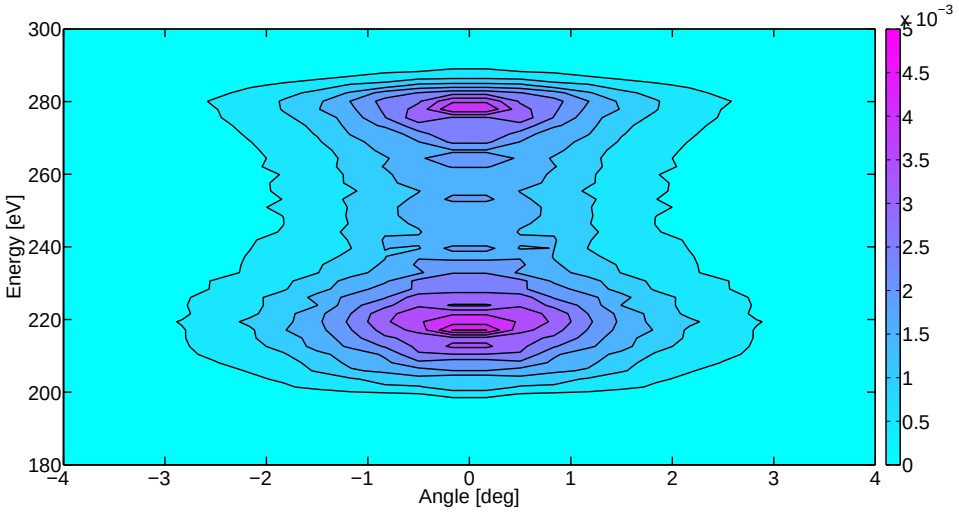

Figure 2: Distribution of positive ions arriving at the wafer as a function of angle and energy.