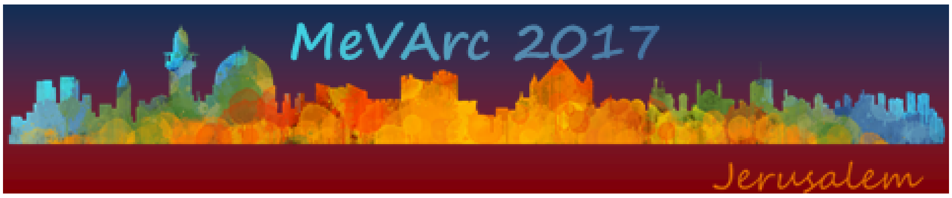

Contribution ID: **19** Type: **oral**

Surface evolution in high electric fields

Thursday 23 March 2017 09:30 (30 minutes)

A common hypothesis for explaining the occurrence of vacuum arcs is that high electric fields enable growth of nanotips on the metallic electrode surfaces. These tips are locally enhancing the field enough to cause field emission and start processes that eventually cause an arc. We have developed a Kinetic Monte Carlo (KMC) model that describes the atom diffusion on metal surfaces as thermally activated processes, while also taking into account the effect of an electric field on the diffusion processes. The model uses tabulated migration energy barriers and the values of the electric field, obtained by solving Laplace's equation at every KMC step.

We have verified the electric field model by simulating the drift velocity of a single W atom on a W{110} surface in different fields and temperatures. Our results are in a good agreement with experimental results from the literature. In strong fields, the migration of the adatom is biased towards higher fields. The field effect is different for the anode and the cathode and significantly lower for Cu than for W. For Cu surfaces, we have determined the minimal conditions, such as the minimum field, temperature and surface orientation, that allow growth of asperities into tips.

Type of contribution

Oral

session

Modelling and Simulations

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