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2P20 - Simulations of Surface Inhomogeneities in Field Emission

Tuesday 25 June 2019 13:00 (1h 30m)

Surface inhomogeneities can have a large impact on field emission, because it is strongly dependent on the local value of the surface electric field and work function of the metal. Within a given area the bulk of the emitted current may stem from a protrusion where the field is enhanced, or from a site where the work function is lower than in the surroundings. In systems that are large these effects tend to be obscured due to the large number of emitter sites, but for small systems there may be large variation in the performance because each aberration is a significant contributor to the total current emitted. Here we report on simulations done using our molecular dynamics code^{1,2} to simulate the emission from a planar cathode with non-uniform work function on the surface. The distribution, number of inhomogeneities and size are studied and how they affect the beamlet. This is done by calculating the beam emittance and electric current through the system during the simulation.

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2. K. Torfason, A. Valfells, A. Manolescu, "Molecular dynamics simulations of field emission from a prolate spheroidal tip", Phys. Plasmas 23, 123119 (2016).

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