The Beams and Applications Seminar Series

How to Avoid RF Breakdown: Field Evaporation and GCIB Processing

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Bldg. 401, Room B2100
Friday, Oct 17, 1:30 PM

Host: Kwang-Je Kim

A new field evaporation effect has been studied that may be relevant in understanding and controlling vacuum breakdown in an RF-cavity. An atomistic Molecular Dynamics simulation method has been used to model the Copper tip evaporation in a strong periodic electric field. Our results showed that before the surface atoms start to evaporate from the tip's surface by one-by-one mechanism, which should happen above a certain threshold field, the field evaporation occurs by tearing away a group of tip atoms or clusters. This effect occurs long before the threshold electric field is attained, i.e. it is a below-the-threshold effect. These clusters contain from 10 to 100 Cu-atoms and bear multiple charges. A lower electric field can tear off a bigger chunk of the tip, but this happens during a longer time scale, i.e. at a lower field frequency. A new surface smoothening method has been proposed that can smooth the cavity surfaces up to an Angstrom scale, based on a Gas Cluster Ion Beam (GCIB) technique.

For more information visit

http://www.aps.anl.gov/asd/physics/seminar.html

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