Master of Science Thesis Topic:

Electrostatic breakdown at the nanoscale

As the distance between two objects gets smaller than a few micrometers effects that are negligible at larger scales can no longer be ignored. For example, van der Waals forces and quantum mechanical effects become noticeable or even dominant and materials can often no longer be regarded as continua. Experimental investigations have shown large discrepancies between theoretical predictions and measurements of the electrostatic breakdown at the micro- and nanoscale (Figure 1).

With ever shrinking feature sizes in MEMS and novel instrumentation electrostatic breakdown and charging are inherent problems in their design and typically needs to be avoided at all cost.

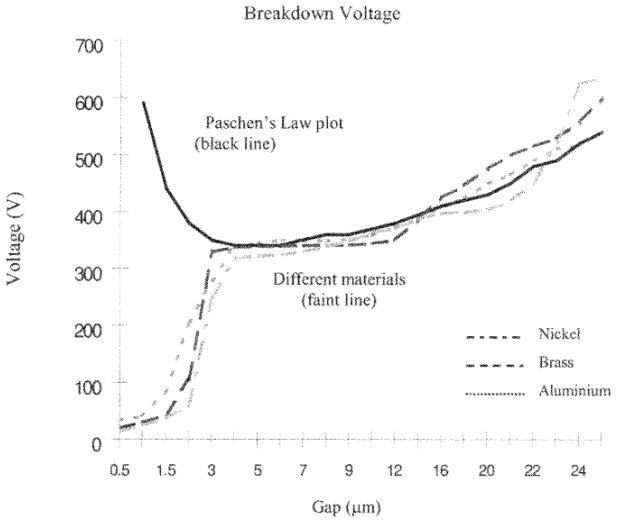

Figure 1: Experimentally found break-down voltages in micrometer gaps compared to the theoretical Paschen's Law [*Nanotechnology* 10, 102–107 (1999)].

This project is aimed at providing a better understanding of the early onset of electrostatic breakdown in the nanoscale and the development of design guidelines for two relevant case studies.

Who are you?

You have affinity with theoretical research as well as a strong interest in physical phenomena in microsystems. Knowledge of electronics is a plus.

Deliverables

The project is aimed at a theoretical investigation of the electrostatic breakdown in microsystems. Design guidelines aimed at avoiding this phenomenon in real life situations are to be found.

Interested?

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