the EM fields and the plasma properties (e.g. gas temperature). All these results were obtained using the modeling platform Plasimo.

*Supported by the Dutch Technology Foundation (STW Project Nos. 10497 and 10744) and by the Energy Research Center of the Netherlands (ECN).

MR1 36 Self-Organized Patterns of Spots In DC Glow Microdischarges in Krypton* WEIDONG ZHU, *Department of Applied Science and Technology, Saint Peter's University, 2641 Kennedy Blvd, Jersey City, NJ 07306, USA* PEDRO G.C. ALMEIDA, MIKHAIL S. BENILOV, DIEGO F. SANTOS, *Departamento de Física, Universidade da Madeira, Largo do Município, 9000 Funchal, Portugal* PRAJWAL NIRAULA, *Department of Applied Science and Technology, Saint Peter's University, 2641 Kennedy Blvd, Jersey City, NJ 07306, USA* Self-organized patterns of cathodic spots have been observed in DC microdischarges in xenon. Modeling of microdischarges in xenon has revealed existence of multiple solutions. Some of the solutions describe normal discharges, others describe 2D patterns of cathodic spots, and others describe 3D patterns similar to those observed in experiments. A very interesting question is why modes with self-organized patterns have been observed in DC microdischarges in xenon but not in other gases. Modeling suggests that self-organized patterns can be observed in gases other than xenon provided that conditions are right. In the present work, self-organized patterns of spots observed in DC microdischarges in krypton are reported. The experiments are guided by modeling and the discharge device employed in the experiments consists of a molybdenum foil as the anode, an aluminum oxide plate as the dielectric spacer and another molybdenum foil as the cathode. Each layer of the device is 0.25 mm thick. Circular openings of 0.75 mm in diameter are prepared on both anode and dielectric spacer and are aligned. The whole device is assembled by Torr Seal epoxy. Research grade krypton is used to fill the chamber to a pressure of 200-1200 Torr.

*This work was supported by FCT through the projects PTDC/FIS-PLA/2708/2012 and PEst-OE/MAT/UI0219/2011.

MR1 37 THERMAL PLASMAS, ARCS, JETS, SWITCHES, OTHERS

MR1 38 Simulation Research of Influence of Retarded Axial Magnetic Fields on Vacuum Arc in DC Interruption Process* LIJUN WANG, SHENLI JIA, LILAN HU, LING ZHANG, ZONGQIAN SHI, SHUWEI FAN, *Xi'an Jiaotong University* In this paper, based on magnetic-hydrodynamic dynamic (MHD) model, the influence of retarded axial magnetic fields (AMFs) on vacuum arc characteristics in fast direct current (DC) interruption process was simulated and analyzed. Magnetic field calculation results showed that the faster current decreased, the more obviously AMF lagged behind arc current. On one hand, higher AMF strength can restrain the contraction of vacuum arc more efficiently, so that the distribution of current density in arc column region was more homogeneous; on the other hand, higher AMF strength restrained plasma diffusion in current zero stage, which made residual plasma density between electrodes at current zero moment keep higher value, and the possibility of arc re-ignition increased as well. By weakening AMF strength at current dropping stage, DC arc can be more easily interrupted successfully. The correctness of simulation results also was verified by experimental results. In artificial crossing-zero stage, as current decreased, the decrease of light intensity and arc diameters were consistent with those in experimental results.

*This work is supported by National Natural Science Foundation of China (50907045).

MR1 39 Flow Dynamics from a Nonequilibrium Atmospheric-Pressure Arc Discharge Jet JUAN TRELLES, *University of Massachusetts Lowell* Plasma jets are used as directed sources of energy, momentum and excited species fluxes in diverse technologies, such as spray coating, chemical synthesis, waste treatment and pyrolysis. The fluid, thermal and electromagnetic dynamics from the jet produced by a direct-current non-transferred arc plasma torch are explored using time-dependent three-dimensional simulations encompassing the dynamics of the arc inside the torch, the development of the jet through the outside environment, and the later impingement of the jet over a substrate. The plasma flow is described mathematically by a chemical equilibrium and thermodynamic nonequilibrium (two-temperature) model and numerically by a coupled fluid-electromagnetic transport model and a Variational Multiscale Finite Element Method. Simulation results uncover various aspects of the flow dynamics, including the jet forcing due to the movement of the arc, the prevalence of deviations between heavy-species and electron temperatures in the plasma fringes, the development of shear flow instabilities around the jet, the occurrence of localized regions with high electric fields far from the arc, the fluctuating expansion of the gas ejected from the torch, and the formation and evolution of coherent flow structures.

MR1 40 PLASMA ETCHING

MR1 41 Reduction of Aspect Ratio Dependency in Silicon Trench Etch* ROBERT BATES, *University of Texas at Dallas* The etch rate of deep features in silicon, such as trenches and vias, can vary significantly with the changing aspect ratio (AR) of the feature. This work focused on using a continuous plasma process utilizing a gas mixture of SF_6-C_4F_8-Ar to produce trenches of varying widths and depths. Optical and electrical diagnostics of percent flow, total flow and RF bias on trench profiles were investigated. Experiments were also performed to show that the etch rate of low AR features can be reduced through the deposition of a passivation layer and thereby allow larger AR features to "catch up". It is also possible to invert the ARDE in certain circumstances.

*Financial Support: TI/SRC Award # 2261.001.

MR1 42 Plasma Processing of Large Curved Nb Surfaces with Application to SRF Cavities* JANARDAN UPADHYAY, DO IM, FREDERICK MILLER, SVETOZAR POPOVIC, LEPOSAVA VUSKOVIC, *Center for Accelerator Science, Department of Physics, ODU, Norfolk, VA* LARRY PHILLIPS, ANNE-MARIE VALENTE-FELLICIANO, *TJNAF, Newport News, VA* Surface modification of superconducting radio-frequency (SRF) cavities are a promising alternative to the wet etching technologies that are currently applied to Nb cavities. We have built a Nb etching cylindrical discharge chamber, comparable by volume to 1.5 GHz resonant cavity with 8 observation ports for holding the Nb samples, spectral observations, and electric probe measurements. Several asymmetric discharge configurations were tested with a variety of pressure,