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Studies of the vacuum breakdown behavior using refractory-metal thin film coated electrodes RANDOLPH FLAUTA, JOHN KIONKA, MARTIN JOHN NEUMANN, DAVID RUZIC, Center for Plasma-Material Interactions, Department of Nuclear, Plasma, and Radiological Engineering, University of Illinois at Urbana-Champaign, JOHN CAUGHMAN, Fusion Energy Division, Oak Ridge National Laboratory, UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN TEAM, OAK RIDGE NATIONAL LABORATORY COLLABORATION — A reliable operation of ICRF antennas in fusion devices is often limited by its breakdown threshold. Surface conditions of electrodes during high voltage operations have played a key role in affecting breakdowns. In this work, the effects of coating electrodes with refractory-metal thin films to improve on the reliability and power delivered by ICRF antennas have been investigated. Using the Surface Plasma Arcs by Radiofrequency - Control Study (SPARCS) facility at the Center for Plasma-Material Interactions which is designed as a DC system, the current and voltage breakdown patterns and the measured energy in the arc at an electric field of up to 150 MW/m were studied. Experiments with electrodes coated with W, Mo and Ta operated at high temperature of 600 ^{o}C and above were explored. Surface studies were also conducted on the electrodes to determine the electrode conditions and other surface reactions after the breakdown.

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