

Investigation of High Current Vacuum Arcs during the Formation of Anode Modes by Time and Space Resolved Spectroscopy

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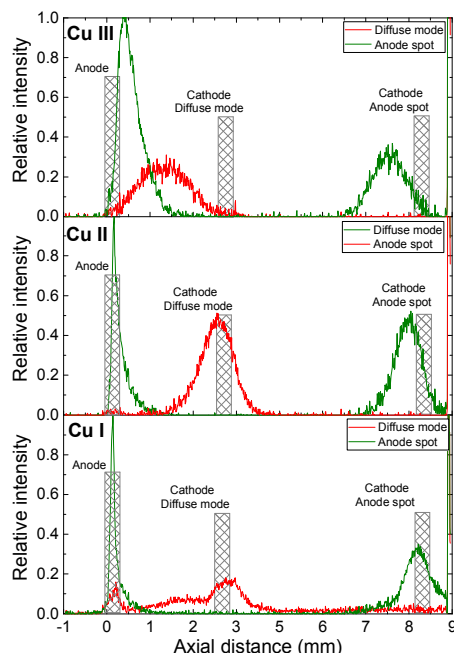
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Abstract

The paper presents time and space resolved optical investigations of high current vacuum arc discharges by means of high-speed video imaging and spectroscopy. Especially, the transition from the diffuse arc mode to one of constricted modes (footpoint, intense or spot mode) has been studied in dependency on arc current and instantaneous electrode distance. Sine-like current waveform at 50 Hz was applied. Spectral lines of Cu I, Cu II, and Cu III have been analyzed for various anode modes using a combination of spectrograph and high speed camera.

The results show the significant changes in the intensities of the atomic and the ionic Cu lines near the anode during the transition to the anode spot mode. Spatial distribution of atomic and ionic Cu lines is also affected by the formation of the high current anode phenomena near the cathode and in the interelectrode gap. In case of anode spot the intensity of the ionic lines decreases significantly in the middle of the electrode gap. High speed camera images with different metal interference filters confirm the results.



Spatial distribution of selected Cu lines for diffuse and anode spot modes