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Study of the mass-to-charge composition of plasma at the moment of ignition and extinction of a vacuum arc with copper-chromium electrodes

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In vacuum circuit breakers, devices for emergency interruption of industrial-frequency currents with amplitudes up to tens of kiloamperes, a vacuum arc inevitably occurs when contacts open. This study investigated the mass-charge composition of the plasma generated during the formation, operation, and extinction of a vacuum arc with a current density typical for vacuum circuit breakers. Two sets of copper-chromium electrodes used in vacuum circuit breakers were studied, with copper and chromium ratios of 70 %/30 % and 50 %/50 %, respectively, with an axial magnetic field of approximately 1 T applied to the interelectrode gap and in the absence of a magnetic field.

Keywords: vacuum arc ion source, high charge state ions, heavy metal ions, ion beam.

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