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Lifetime of Hydrogenised Film Cathode in Vacuum Arc Discharge ion Source

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The paper describes the results of investigation of the mass-to-charge state of the plasma ions produced in a vacuum arc discharge with a composite cathode. The cathode is a bottom end of copper disk covered by hydrogen-saturated zirconium film of thickness 10, 15 and 35 μm . With the such cathode the vacuum arc ion source provides generation of multicomponent gas and metal ion beams with a hydrogen ion fraction from several percent to several tens of percents. During the arc current pulse the fraction of hydrogen in the plasma decreases, while the copper and zirconium ions fractions increase. It was also investigated evolution of hydrogen ions fraction in the process of the film erosion. For this purpose lifetime tests were performed. The lifetime of the film cathode as the source of hydrogen ions depends of film thickness and the pulse repetition rate. At the end of the tests the zirconium ions of the beam disappeared almost completely.

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