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# HIGH-INTENSITY ION BEAMS WITH SUBMILLISECOND DURATION FOR SYNERGISTIC OF ION IMPLANTATION AND ENERGY IMPACT ON THE SURFACE

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The development of methods to modify materials based on the synergistic high-intensity implantation and simultaneous energy impact on the ion-doped layer involves using the pulsed and repetitively-pulsed beams of metal and gas ion beams with micro-submillisecond duration with high pulsed power density. The paper presents the results of experimental studies on the formation of pulsed and repetitively-pulsed high-intensity beams of titanium ions with a pulse duration from 150 to 500 μs. The plasma flow was generated by a vacuum arc discharge. To obtain ion beams with a power density in the range from several tens to several hundreds of kilowatts per square centimeter, ballistic focusing of ions was used using an extracting grid electrode in the form of a part of a sphere. Implementing the "solar eclipse" effect excluded the possibility of direct passage of macroparticles, explosive emission products in the cathode spot from the cathode's working surface into the focused beam region into the geometric focus of the ballistic focusing system. The features of the forming the high-power repetitively-pulsed beams of titanium ions were studied using both the ion source "Rainbow 5" and the plasma immersion approach, when the focusing system was immersed in a titanium plasma flow and a negative bias potential was applied to it. Data are presented on the influence of the ion beam space charge neutralization processes at current densities from fractions to several amperes per square centimeter on the efficiency of the ion beam's transport and focusing at accelerating voltages from 10 to 40 kV.