GENERATION OF BORON ION BEAMS BY VACUUM ARC ION SOURCE WITH LANTHANUM HEXABORIDE AND BORON CARBIDE CATHODES
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Boron ion beams are used for technologies. Firstly, it is boron doping of semiconductors, and secondly it is ion beam modification of the surface. Boron compounds have a high hardness, so such modification can significantly increase the lifetime of tools and machine parts. The boron rich ion beam was generated by vacuum arc ion source with two boron-containing cathodes. These are lanthanum hexaboride (LaB₆) and boron carbide (CB₄) cathodes. The electrical conductivities of LaB₆ and CB₄ were much more than pure boron and it allows vacuum arc to operate with current of hundreds of amperes and pulse duration of hundreds of microseconds. The parameters of the boron reach ion beam were investigated. Using the time-of-flight (TOF) mass spectrometer, the mass-charge state compositions of ion beams are determined.

CONCLUSION
Wide-aperture boron ion beams of about 0.5 A total current and 250 µsec pulse duration in a vacuum arc ion source with lanthanum hexaboride or boron carbide cathode have been extracted with voltage up to 60 kV. The fractions of boron ions in a beams were 86 % for lanthanum hexaboride and 80 % for boron carbide cathode. These fractions are correspond to atomic fraction of boron in cathode materials. The work was supported by Russian Science Foundation, project # 16-19-10034.