

## Generation and Application of High Intensity Pulsed Ion Beams Using Active Plasma Sources

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The report highlights the researches relating to generation and application of high intensity pulsed ion beams formed by the direct ion acceleration in diode systems or the collective ion acceleration using pulsed electron beams. The dense plasma formed by additional plasma sources served as an ion source. These techniques allow us to form the ion beams of various masses,  $10^{-8}$  to  $10^{-6}$  pulse durations, and  $10^5$  to  $10^7$  eV energies for direct ion acceleration. In the case of collective acceleration of heavy ions, the energy can reach  $10^8$  eV and more.

The explosion of research activities in the field of beam generation dates back within the 60<sup>th</sup> – 90<sup>th</sup> of the last century. Last 20 years, we have been observing a certain recession in ex-

perimental and theoretical researches on beam generation. However, the researches on practical application of high intensity ion beams for material science were ongoing.

The application of such beams to study material behavior under energy flows exceeding  $10^9$  W/cm<sup>2</sup> or to form ablation plasma ranging within  $10^8$  –  $10^9$  W/cm<sup>2</sup> seem to be very promising. The researches on practical applications of high intensity ion beam sources with energy flows exceeding  $10^6$  to  $10^7$  W/cm<sup>2</sup>, which have been developing in Tomsk Polytechnic University, are reviewed. Most important goals of these researches, which would allow us to extend the application potential of high intensity ion beams of nanosecond duration, are considered.