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Slow highly charged ions for nanoscale surface modifications

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Abstract

With the Dresden EBIT (electron beam ion trap) a room temperature, compact and long-term stable source of slow highly charged ions (HCIs) has been developed and prepared for small series production. A wide spectrum of ions such as Ar¹⁸⁺, Fe²⁴⁺ and Xe⁴⁴⁺ have been produced and extracted with energies less than $q \times 10$ keV (q – ion charge). At ion–surface interactions the high neutralization energy of the ionic projectiles leads to high power densities of 10^{12} – 10^{13} W/cm² at the surface. Thus, these ions can produce nanoscale material modifications and can be used for surface analysis techniques as well. Examples of extracted and magnetically analyzed ion beams are given. Fields of applications of slow highly charged ions are summarized.

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