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# The Dresden EBIT: An ion source for materials research and technological applications of low-energy highly charged ions

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## Abstract

We report on a room temperature electron beam ion trap (DEBIT: Dresden EBIT). The construction of the DEBIT allows it to produce dense electron beams with current densities of at least  $500 \text{ A cm}^{-2}$  and an ionization factor of  $5 \times 10^{21} \text{ cm}^{-2}$  for electron beam energies up to 15 keV. Ions like  $\text{Fe}^{26+}$ ,  $\text{Kr}^{34+}$ ,  $\text{Xe}^{49+}$  and  $\text{Hg}^{70+}$  have been detected by X-ray spectrometry. The developed device has a high potential for investigations in nanomechanics, potential sputtering, information technology, ion beam lithography, etc., as it was demonstrated by different authors in studies utilizing a cryogenic EBIT or ECR ion sources. To enable adequate investigations a first compact ion extraction system for the DEBIT is described. © 2001 Elsevier Science B.V. All rights reserved.

**Keywords:** Highly charged ions; Electron beam ion trap; X-ray spectroscopy; Ion extraction; Technological applications

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