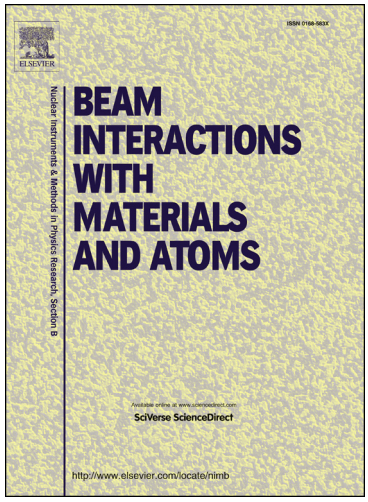

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Development of Ionic Liquid Ion Source with Porous Emitter for Surface Modification

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Abstract

Ionic liquid (IL) ion sources with three different emitter tip materials, stainless steel, tungsten and graphite were developed and examined on ion beam characteristics with respect to its ILs wettability. It was observed that EMIM-BF_4 ion beam produces mostly single cations or anions for positive or negative modes respectively, and exhibits a few cation-anion pairs attached with a cation or an anion. On the other hand, the main content of the BMIM-PF_6 ion beam was the cation-anion pairs while the single ions were minor components. As a result of ion current measurements, the largest and the most stable emission current were obtained for the graphite emitter tip. The results indicate that the emitter wettability likely plays an important role in the current stability.

Keywords: ion source, ionic liquid, wettability, graphite tip, field emission

1. Introduction

Polyatomic ion beam processes have important characteristics such as equivalently high currents, shallow implantation depths, and low implantation damages. In the past decade, ionic liquid ion sources (ILIS) have