



## SDI Review Form 1.6

### **PART 1:**

Journal Name:	<a href="#">Physical Review &amp; Research International</a>
Manuscript Number:	2013_PRRI_3906
Title of the Manuscript:	Determination of the optimum design and extraction optics for a glow discharge Ion source

**General guideline for Peer Review process is available in this link:**

**(<http://www.sciencedomain.org/page.php?id=sdi-general-editorial-policy#Peer-Review-Guideline>)**

- This form has total 7 parts. Kindly note that you should use all the parts of this review form.



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### **PART 2: Review Comments**

	<b>Reviewer's comment</b>	<b>Author's comment</b> <i>(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)</i>
<b><u>Compulsory</u></b> REVISION comments	<p>Description of the experimental setup in lines 61-76 is confusing.</p> <p>Line 62: "... a plane copper cathode with different hole diameters ...". Here it is not clear if the cathode is plane or has an orifice.</p> <p>Line 64-65: "The copper cathode has different holes to permit the gas flow through the anode cylinder". Again is the cathode plane or has different holes?</p> <p>Fig. 1 looks confusing. Here an insulator between the cathode and the anode is drawn. This insulator prevents continuous discharge. In this construction the only way for the continuous discharge is through the gas inlet orifice. If this is so, it should be clearly explained in the text. Alternatively radio-frequency discharge can be ignited through the insulator, but from the article the discharge is seemed to be dc one.</p> <p>Lines 118 – 120: "It is seen from this figure that a maximum ion beam current can be obtained at an extraction hole diameter of 7 mm, ...". There is no dependence of ion beam current of the hole diameter. Therefore, this is not seen.</p> <p>Line 260: The title of the Fig. 8 (influence of the voltage applied to the extractor electrode) does not correspond to the contents of the figure (influence of the space charge).</p>	



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	<p>Line 274: "It was found that the optimum extraction gap ...". What are criteria of optimization? I should be explained in the article.</p> <p>Line 312: "The dependence of the ion beam envelope on the negative voltage applied to the extractor ... was numerically computed ...". Because Fig. 8 has disagreement between its contents and title, this conclusion is not result of the article.</p> <p>Line 318: "... the simulation was compared with experimental results ...". In the article, the simulation was NOT compared with experimental results</p>	
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<p><b>Minor</b> REVISION comments</p>	<p>There are many mistakes in English. Probably the authors should ask a native English speaker to check the article.</p> <p>Line 37, 38. What means “shape of emitted psrticles”? May be the authors mean distribution of particles?</p> <p>Line 63: “... with a plane of diameter 2 mm ...”. Do the authors mean an orifice to extract ions from the discharge, also known as a sampler orifice?</p> <p>Fig. 1. Please, could the authors explain meaning of 50 kOhm limiting resistors in the circuits of the anode and the faraday cup. The ballast resistor at the glow discharge circuit is typically not so high...</p> <p>Line 74: “... the ion source terminals”. The term “terminals” is not clear. Do the authors mean electrical connections, or feedthroughs, or something else?</p> <p>Fig. 1. Abbreviations like mA or kV are not typical in such figures. It is better to write something like “voltmeter”, “ampermeter”, etc. Also P.S. should be expanded to “Power Supply”</p> <p>Fig. 2. In which units the voltage and the current are presented?</p> <p>Line 105: “Figure 3 shows the ion beam efficiency, i.e. relation between ...”. The term “efficiency” is rather ratio between beam and discharge currents. But the Fig. 3 shows the currents itself rather than ratio.</p> <p>Fig. 3. In which units <math>I_d</math> and <math>I_b</math> are presented? What are discharge voltage and gas pressure at these</p>	
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	<p>measurements? What are D and PN2?</p> <p>Fig. 4. In which units voltage and current are presented? Please, could authors also indicate voltage of the discharge.</p> <p>Lines 128 – 129: “It is seen from this figure, the maximum output beam current could be obtained at distance of 6 mm”. From the figure 5 it is not seen if the maximum current is reached at distance of 5 or 6 mm.</p> <p>Fig. 5. In which units the voltage and current are presented? Could authors please indicate also the discharge voltage.</p> <p>Line 135. What means “separated distances”?</p> <p>Line 137 – 138: “It is clear ... at a distance of 6, 12 mm, respectively”. From the figure it is seen that the minimum output beam current may be (and probably is) at even longer distanced than indicated.</p> <p>Fig. 6. There is something wrong in the title of the vertical axis.</p> <p>Line 151: Could the authors please clarify why the extraction system is “diode” one.</p> <p>Line 152: “... two-or ...”. This is probably a misprint.</p> <p>Line 154: “... creating an electrode or non-electrode”. Do the authors mean electrode or free space?</p> <p>Line 158: what is V? From the context it is clear that V is electrical potential, however it is not defined in the text.</p>	
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	<p>Line 167: "... vd is a drift velocity". I'm afraid the term "drift" is wrong in this context. This is just a velocity of movement of each ion.</p> <p>Line 175. Could the authors please give a reference for this formula and define J, I and other parameters.</p> <p>Fig. 7. The legend of the graphs is not clear.</p> <p>Line 198: "Pierce solved the problem ...". Could the authors please give a reference.</p> <p>Lines 214, 215: "... space charge compensation will automatically work ...". Please, could the authors explain what is "space charge compensation".</p> <p>Line 217: "Space charge was compensated ...". Please could the authors explain this.</p> <p>Line 222: "... at currents of <math>10^{-4}</math> A". Please, could the authors compare this threshold current with ion beam current which can be extracted from the glow discharge in real experimental conditions.</p> <p>Fig. 8. Here the skimmer (extracting electrode) has other form than in Fig. 1. This is confusing. Please, could the authors improve Fig. 1, The beam current reaches 100 mA. Like in the previous point, could the authors please compare this current with ion beam current which can be extracted from the glow discharge in real experimental conditions.</p> <p>Fig. 9 c. The mark (c) is drawn twice.</p>	
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	Line 315: "Minimal ion-beam trajectories were obtained ...". What are "Minimal ion-beam trajectories"?	
<b><u>Optional/General</u></b> comments	The topic of the article – behaviour of ions extracted from glow discharge – is interesting and important practically. However the article is written very not accurately. It includes even strong mistakes, for example false conclusions.	

**Note: Anonymous Reviewer**