First, we would like to thank both reviewers for their careful review and the editor for giving us the opportunity to address the comments. We have replied to and made the revisions based on the comments of reviewers. Attached please find the reply letter to the reviewers’ comments and the revisions in text. We have highlighted the revisions in our revised manuscript for your reference. Thank you so much for your consideration and we are looking forward to hearing from you soon regarding our resubmission!

Best regards,
Qing Su

Review 1:
General comment and recommendation:

The manuscript describes the formation of a helium bubbles in SiOC and Fe composites and compares these results to the bubble formation in pure Fe and SiOC. The helium bubble formation in SiOC and Fe composites is reduced compared to pure Fe. It is concluded that the Fe/SiOC interface enhances the resistance of the composite material to helium bubble formation.

The manuscript describes a very interesting and important effect that might help to develop radiation hardened materials. The experiments and measurements were performed thoroughly, and the conclusions are supported by the presented data. The manuscript requires only minor modifications.

Specific comments:
The English language is understandable, but could be improved. A revision by a native English speaker is recommended.

Authors’ reply: This is a very good suggestion. It has been revised by a native English speaker.
Page 2, line 69-70: “The thickness of the pure α-Fe film…” If anything is known about the oxygen and/or impurity concentration in the deposited film, then this information could be added.

Authors’ reply: This is a very good comment. Unfortunately, we do not know these information at this point.

Page 2, lines 70 – 72: How many multilayers were deposited?

Authors’ reply: This is a very good comment. Two kinds of multilayer were deposited. There are 14 alternating layers for thick SiOC/Fe multilayer films and 74 alternating layers for thin SiOC/Fe multilayer films. The information has been added in the revised manuscript.

Page 2, lines 70 – 72 and Figs. 3a) and 3g): The multilayers show some roughness. If any quantitative information about the roughness is available, then it could be added.

Authors’ reply: This is a very good comment. The roughness of typical SiOC and Fe layer ranges from 3 to 5 nm, as suggested by previous X-ray reflectivity experiment. The roughness information has been added into the experimental session.

Page 2, lines 77 – 78: “The Fe/SiOC nanolaminate was treated as a uniformly distributed amorphous target material…” The composition of this uniformly distributed material should be given for clarity.

Authors’ reply: This is a very good suggestion. We have added these information in the revised manuscript.

Page 2, line 79: “The displacement energies for Si, O, C and Fe are 15, 28, 28 and 40 eV, respectively.” For clarity this statement should be changed to “The assumed displacement energies for Si, O, C and Fe are 15, 28, 28 and 40 eV, respectively.”

Authors’ reply: This is a very good suggestion. We have made this change in the revised manuscript.

Page 2, line 81: “…and density of 2.2 g/cm3” How does this density compare to the theoretical density of SiOC?
Authors’ reply: This is a very good comment. SiOC is a class of non-crystalline and disordered ceramic materials which is usually synthesized by chemical methods like sol–gel or chemical vapor deposition. There are no thermodynamically stable SiOC crystalline phases found naturally, therefore there is no available theoretical density of SiOC.

Page 2, Section 2: Is anything known about the density of the Fe film?
Authors’ reply: This is a very good comment. The density of Fe layers is 6.92 g/cm$^3$, approximately 14% lower than that of pure Fe target due to shadowing effects during the sputtering process.

Page 2, lines 82 - 83: “… fluences of 6.8×10$^{16}$, 8.3 6.5×10$^{16}$ and 7.0×10$^{16}$ ion/cm$^2$ was implanted…” What was the size of the implantation spot? What was the homogeneity of the implantation? How was the fluence measured?
Authors’ reply: There are very good comments. The beam spot size was 8mmX10mm. The fluence variation within the beam spot was typically within ±10%. The fluence was measured by monitoring the charge collection on the target. The target was biased during the irradiation to suppress the error caused by secondary electrons. Such a setup has shown good accuracy in fluence determination, of uncertainty of <15%, based on previous testing from secondary ion mass spectrometry analysis of various implants in Si and Fe substrates. There information has been added into the revised manuscript.

Figure 1: For clarity it would be better to draw the x-axes only until 800 or 900 nm.
Authors’ reply: We appreciate the reviewer’s comment regarding drawing the x-axes to 800 or 900 nm. However, we still prefer to use 1000 nm because that is the film thickness of all specimens. By plotting the figure in this way, the readers could know the He concentration and damage profile of the whole film.

Page 3, line 116: “…no helium bubbles were observed…” It should be discussed shortly, if very small bubbles not visible in TEM could be present. The smallest visible bubble diameter should be given.
Authors’ reply: There are very good comments. A statement “no helium bubbles (>1 nm) were observed in pure SiOC film after 5 at% He implantation, Figs. 2c and 2d. This result was consistent with previous finding that He atoms in SiOC remain in solution and are able to outgases from the material via atomic-scale diffusion” has been added to clarify it.

Page 6, lines 145 – 160: Some information about the diameters of the bubbles shown in Fig. 4(a) should be given. Do the bubble diameters change with depth?
Authors’ reply: This is a very good comment. A statement “The average bubble diameters for the Fe layers in thick and thin composite are 1.2 ± 0.1 and 1.2 ± 0.2 nm, respectively. No change in bubble diameters was observed with depth.” has been added.

Figure 4: The dashed lines are explained in the text, but should be explained also in the figure caption.
Authors’ reply: This is a very good comment. A statement “The dashed lines are drawn to help estimate threshold concentration for the formation of detectable He bubbles.” has been added in the figure caption to explain it.