Skoltech
Skolkovo Institute of Science and Technology

Thesis Changes Log

Name of Candidate: Olga Yamilova

PhD Program: Materials Science and Engineering

Title of Thesis: Revealing electrochemical degradation pathways in complex lead halides and design of stable perovskite solar cells

Supervisor: Professor Keith Stevenson

The thesis document includes the following changes in answer to the external review process.

I am grateful to the Jury Members for their positive feedback and comments. I am happy to address the comments and questions in this document and in the revised version of the Thesis.

Response to Prof. Annie Ng

The minor revision is to put the initial PCE of the test devices in the appendix.

In the Supplementary materials, Appendix A, were added Figures A2, A3, A4, A5, A7, A8. They include not only initial PCE absolute values, but also all device parameters (open circuit voltage V_{OC}, short circuit current density J_{SC}, fill factor FF and power conversion efficiency PCE) evolution as functions of the parameters from electric bias exposure time. Also references to these figures were added into the main text.

Response to Prof. Jovana Milic

Briefly revise the overall content for any remaining typos or language/formatting issues.

The whole text was revised, remaining typos were addressed. I have corrected numerous typos and misprints. Please find the changes log below:

Page 14
- "…and inverted p-i-n(c)…" → "…and inverted p-i-n (c)…";
- "…Figure 7. Figure 7. IR-microscopy for CH3+ migration monitoring under applied electric field in the publication of Y. Yuan et al. Reproduced with permission from ref.[55] Copyright 2015, Wiley …" → "…Figure 7. IR-microscopy for CH_3^+ migration monitoring under applied electric field in the publication of Y. Yuan et al. Reproduced with permission from ref.[55] Copyright 2015, John Wiley & Sons…";
- "…Reproduced with permission from ref.[49] Copyright 2016, ACS Publicationsl …" → "…Reproduced with permission from ref.[49] Copyright 2016, ACS Publications…";

Page 15
- "…Schematic layout of the p-i-n perovskite solar cell architecture (a) The …" → "…Schematic layout of the p-i-n perovskite solar cell architecture (a). The …";

Page 16
- "…Figure 17. PL mapping of different perovskite materials and optical photos of corresponding channels. Channels on all figures oriented horizontally, with cathode on top position and anode in bottom position…"

→ "…Evolution of PL signal in the channel of lateral two-electrode device during the electric bias exposure for various perovskite materials. Optical photos of corresponding channels for every material after the 120 h biasing are presented on the left. Channels on all figures oriented horizontally, with cathode on top position and anode in bottom position.…";
● "…Figure 19. AFM data for corresponding (marked on the left) perovskite materials before and after biasing for 80 hours …" → "…AFM data for corresponding (marked on the left) perovskite materials before and after biasing for 80 hours near both electrodes…";
● "…perovskite photoactive lyers …" → "…perovskite photoactive layers …";

Page 21
● "…most promising perovskite material for photovoltaic applications id demonstrated …" → "…most promising perovskite material for photovoltaic applications is demonstrated …";

Page 23
● "…cheaper compared to mesoporous solar cells …" → "…cheaper compared to the mesoporous solar cells …";

Page 28
● "…Depending on prevailing factor …" → "…Depending on the prevailing factor …";
● "……" → "……";

Page 29
● "…2.2.1 Eletrochemical degradation of bulk perovskite materials…" → "…2.2.1 Electrochemical degradation of bulk perovskite materials…";

Page 32
● "…Copyright 2015, Wiley.…" → "…Copyright 2015, John Wiley & Sons.…";

Page 38
● "…diameter of ~0.01 mm …" → "…diameter of ~ 0.01 mm …";

Page 46
● "…spectacular *insitu* PL imaging …" → "…spectacular *in situ* PL imaging …";

Page 62
● Figure 17. PL mapping of different perovskite materials and optical photos of corresponding channels. Channels on all figures oriented horizontally, with cathode on top position and anode in bottom position…" → "…Evolution of PL signal in the channel of lateral two-electrode device during the electric bias exposure for various perovskite materials. Optical photos of corresponding channels for every material after the 120 h biasing are presented on the left. Channels on all figures oriented horizontally, with cathode on top position and anode in bottom position.…";

Page 63
● "…So this confirms that …" → "…So, this confirms that …";

Page 73
● "…V_{mpp} …" → "…V_{MPP} …";

Page 84
● "…such devices demonstrated zero stability, such devices either were not working …" → "…such devices demonstrated zero stability, they either were not working …";

Page 102
● "…Science 2018, 362, 449-453.…" → "…*Science* **2018**, *362*, 449-453.…".