CLAIMS:

1. A method for:

(i) increasing the secondary electron yield of a dynode and/or

(ii) decreasing the rate of degradation of electron yield of a dynode,

the method comprising the steps of:

(a) exposing a dynode electron-emissive surface to an electron flux, the electron flux being controlled so as to enhance electron-mediated removal of a contaminant deposited on the dynode electron-emissive surface over deposition of the contaminant on the dynode electron-emissive surface; or

(b) controlling the electron current density of the electron flux impacting the dynode electron-emissive surface so as to favour electron-mediated removal of a contaminant over deposition of the contaminant on the dynode electron-emissive surface; or

(c) controlling the amount, concentration, or partial pressure of a removal reactant or precursor thereof on or about the dynode electron-emissive surface;

wherein the method is performed under conditions such that the electron-mediated removal is enhanced relative to a contaminant deposition process so as to provide a net decrease in the rate of contaminant deposition and/or a decrease in the amount of contaminant present on the dynode electron-emissive surface.

2. The method of claim 1, wherein the conditions are such that the electron-mediated removal has a higher efficiency than the contaminant deposition process.

3. The method of claim 1 or claim 2, wherein the electron-mediated removal is reliant at least in part on a removal reactant or precursor thereof, the removal reactant or precursor thereof being either inherently present on or about the dynode electron-emissive surface, or deliberately introduced on or about the dynode electron-emissive surface, the removal reactant or precursor thereof being capable under the method conditions of removing or facilitating removal of a contaminant deposited on the dynode electron-emissive surface.

4. The method of any one of claims 1 to 3, wherein the removal reactant is capable of donating an electron to the contaminant deposited on the dynode electron-emissive surface, or the precursor is capable of conversion to a removal reactant capable of donating an

electron to the contaminant deposited on the dynode electron-emissive surface under the method conditions.

5. The method of claim 3 or claim 4, wherein the removal reactant is involved in a redox reaction with the contaminant deposited on the dynode electron-emissive surface.

6. The method of any one of claims 1 to 5, wherein the removal reactant or precursor thereof is water.

7. The method of any one of claims 4 to 6 comprising the step of introducing the removal reactant or precursor thereof into a vacuum chamber within which the dynode electron-emissive surface is operable.

8. The method of any one of claims 1 to 7, wherein the contaminant deposition process is reliant at least in part on a deposition precursor.

9. The method of claim 8, wherein the deposition precursor is capable of forming a contaminant deposited on the dynode electron-emissive surface, the contaminant deposited on the dynode electron-emissive surface being capable of being involved in a redox reaction with the removal reactant.

10. The method of claim 8 or claim 9, wherein the removal reactant is present on or about the dynode electron-emissive surface at a higher concentration or in higher amounts compared with the deposition precursor.

11. The method of any one of any one of claims 8 to 10, wherein the removal reactant and the deposition precursor are both gases, and the removal reactant is present at a higher partial pressure than the deposition precursor.

12. The method of any one of claims 1 to 11, wherein the electron current density is controlled to an upper or lower limit of a range, within the range limits, whereby any increase in electron density increases the rate of contaminant etching with electron current density but does not proportionally increase rate of contaminant deposition.

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13. The method of any one of claims 8 to 12 as applied to a series of discrete dynodes in an amplification chain, the method comprising the step of adjusting or setting electron current density differentially between the dynodes in the chain such that the flux density is relatively low for dynodes for which contaminant deposition rate is electron-limited, and relatively high for dynodes for which the contaminant deposition rate is deposition precursor -limited.

14. An electron multiplier comprising a series of discrete dynodes or a continuous dynode, each discrete dynode or continuous dynode having an electron-emissive surface, the electron multiplier comprising means for:

(a) exposing the dynode electron-emissive surface(s) to an electron flux, the electron flux being controllable so as to enhance electron-mediated removal of a contaminant deposited on the dynode electron-emissive surface(s) over deposition of the contaminant on the dynode electron-emissive surface(s); or

(b) controlling the electron current density of the electron flux impacting the dynode electron-emissive surface(s) so as to favour electron-mediated removal of a contaminant over deposition of the contaminant on the dynode electron-emissive surface(s); or

(c) controlling the amount, concentration, or partial pressure of a removal reactant on or about the dynode electron-emissive surface(s),

wherein the electron multiplier is controllable such that the electron-mediated removal is enhanced relative to a contaminant deposition process so as to provide a net decrease in the rate of contaminant deposition and/or a decrease in the amount of contaminant present on the dynode electron-emissive surface(s).

15. The electron multiplier of claim 14, comprising means for introducing a removal reactant or precursor thereof on or about the dynode electron-emissive surface(s).

16. The electron multiplier of claim 15, further comprising a conduit configured to convey a removal reactant or precursor thereof onto or about the dynode electron-emissive surface(s), or an absorbent material disposed on or about the dynode electron emissive surface(s) the absorbent material being configured to outgas stored water over a period of time, so as to allow the vacuum chamber to achieve to a desired pressure.

17. The electron multiplier of any one of claims 14 to 16, comprising means for controlling the amount, concentration or partial pressure of a contaminant deposition precursor on or about the dynode emissive surface(s).

18. The electron multiplier of any one of claims 14 to 17, comprising means for increasing the amount, concentration or partial pressure of a removal reactant on or about the dynode emissive surface(s), and means for decreasing the amount, concentration or partial pressure of a contaminant deposition precursor.

19. A method for removing a contaminant from a dynode electron emissive surface, or inhibiting the build-up of a contaminant on a dynode electron emissive surface, the method comprising the method steps of any one of claims 1 to 13.

20. The method of claim 19, when carried out on the electron multiplier of any one of claims 14 to 18.