CLAIMS:

1. A device configured to convert or amplify a particle, the conversion or amplification being reliant on the impact of a particle on a surface of the device causing the emission of one or more secondary electrons from the same surface, wherein the device is a conversion dynode or an amplification dynode or a microchannel wafer or a microchannel plate configured to operate in reflection mode comprising a carbon-based layer capable of secondary electron emission upon impact of a particle, and wherein the carbon-based layer is doped to confer or increase conductivity and is formed by a growth process on a substrate and subject to a post growth modification which causes termination of the carbon atoms.

2. The device of claim 1, wherein the carbon-based layer is a diamond layer or a diamond-like carbon layer.

3. The device of claim 1 or claim 2, wherein the dopant is boron.

4. The device of any one of claims 1 to 3, wherein the carbon-based layer has a crystalline structure.

5. The device of any one of claims 1 to 4, wherein the carbon-based layer has a minimum thickness to provide for a required secondary electron yield.

6. The device of any one of claims 1 to 5, wherein the carbon-based layer has a thickness of less and about 5 nm, or less than about 1 nm, or between about 1 nm and about 500 nm, or between about 1 nm and about 100 nm.

7. The device of any one of claims 1 to 6, wherein the growth process is a deposition process.

8. The device of claim 7, wherein the deposition process is a vapour deposition process.

9. The device of any one of claims 1 to 8, wherein the carbon-based layer formed by growth on a substrate is subjected to post-growth modification.

10. The device of claim 9, wherein the post-growth modification increases the negative electron affinity of at least a portion of the carbon atoms of the carbon-based layer.

11. The device of any one of claims 1 to 10, wherein the termination is hydrogen termination.

12. The device of any one of claims 1 to 11, wherein the post-growth modification is by exposure of the carbon-based layer to a gas plasma.

13. The device of claim 12, wherein the gas plasma is generated from hydrogen gas.

14. The device of claim 12 or claim 13, wherein the gas plasma is generated by heating a gas.

15. The device of any one of claims 1 to 14, wherein the substrate is a metal.

16. The device of claim 15, wherein the metal is a transition metal.

17. The device of claim 16, wherein the transition metal is a second row or third row transition metal.

18. The device of claim 17, wherein the second row transition metal is molybdenum, or the third row transition metal is tungsten.

19. An ion detector, electron multiplier, or photomultiplier comprising the device of any one of claims 1 to 18.

20. A mass spectrometer comprising the device of any one of claims 1 to 18.

21. A method for fabricating a device configured as a conversion dynode or an amplification dynode or a microchannel wafer or a microchannel plate configured to convert or amplify a particle, the conversion or amplification being reliant on the impact of a particle on a surface of the device causing the emission of one or more secondary electrons from the same surface, the method comprising the steps of providing a substrate suitable for use in a reflection mode dynode or a microchannel wafer or a microchannel plate, and forming a carbon-based layer on the substrate by a growth process with a dopant to increase conductivity, wherein the carbon-based layer formed by growth on the substrate is subjected to a post-growth modification step to cause termination of at least a portion of the carbon atoms of the carbon-based layer.

22. The method of claim 21, wherein the carbon-based layer is a diamond layer or a diamond-like carbon layer.

23. The method of claim 21 or claim 22, wherein the dopant is boron.

24. The method of any one of claims 21 to 23, wherein the carbon-based layer is formed as a monocrystalline diamond layer.

25. The method of any one of claims 21 to 24, wherein the carbon-based layer is formed so as to have a minimum thickness to provide for a required secondary electron yield.

26. The method of any one of claims 21 to 25, wherein the carbon-based layer is formed to have a thickness of less than about 5 nm, or less than about 1 nm, or between about 1 nm and about 500 nm, or between about 1 nm and about 100 nm.

27. The method of any one of claims 21 to 26, wherein the growth process is a deposition process.

28. The method of claim 27, wherein the deposition process is a vapour deposition process.

29. The method of any one of claims 21 to 28, wherein the post-growth modification step increases the negative electron affinity of at least a portion of the carbon atoms of the carbon-based layer.

30. The method of any one of claims 21 to 29, wherein the termination is hydrogen termination.

31. The method of any one of any one of claims 21 to 30, wherein the post-growth modification step is by exposure of the carbon-based layer to a gas plasma.

32. The method of claim 31, wherein the gas plasma is generated from hydrogen gas.

33. The method of claim 31 or claim 32, wherein the gas plasma is generated by heating a gas.

34. The method of any one of claims 21 to 33, wherein the substrate is a metal.

35. The method of claim 34, wherein the metal is a transition metal.

36. The method of claim 35, wherein the transition metal is a second row or third row transition metal.

37. The method of claim 36, wherein the second row transition metal is molybdenum, or the third row transition metal is tungsten.