CLAIMS

1. An ion collision cell, comprising:

an insulating plate having two surfaces;

a plurality of conductive elements, each element having a cross-section configured for forming an electrode surface;

wherein all of the elements are attached to one surface of the insulating plate along their length, whereby the electrode surfaces of all of the elements define an ion transport tunnel.

2. The ion collision cell of claim 1, wherein the plurality of elements comprises four elements.

3. The ion collision cell of claims 1 or 2, further comprising a plurality of elongated seals provided at the periphery of the transport tunnel to thereby seal most of or the entire length of the transport tunnel.

4. The ion collision cell of claim 3, wherein the plurality of elongated seals comprise a plurality of thin flat strips.

5. The ion collision cell of claims 3 or 4, wherein each of two adjacent electrode surfaces are separated by a gap of length g, and wherein each of the elongated seals is positioned behind a corresponding gap at a distance d of length greater than length g.

6. The ion collision cell of any one of claims 3 to 5, further comprising a gas injection inlet enabling gas injection into the ion transport tunnel.

7. The ion collision cell of any one of claims 1 to 6, wherein the insulating plate comprises a printed circuit board.

8. The ion collision cell of claim 7, further comprising pogo pins making electrical contact to each of the elements.

9. The ion collision cell of any one of claims 1 to 8, wherein the conductive elements are curved and form an ion transport tunnel making 180 degrees turn.

10. The ion collision cell of claim 9, wherein the plurality of elements comprises four elements and the electrode surfaces define an ion transport tunnel having a square cross-section.

11. An ion collision cell assembly, comprising:

an insulating plate having two surfaces; and

four elongated conductive elements attached to one surface of the insulating plate along their length to thereby form an ion transport tunnel, wherein each of the conductive elements is curved such that the transport tunnel forms a 180 degree turn.

12. The assembly of claim 11, wherein the ion transport tunnel has a square cross-section.

13. The assembly of claims 11 or 12, further comprising four elongated seals, each provided between two of the conductive elements, thereby sealing the transport tunnel throughout its length.

14. The assembly of claim 13, further comprising gas inlet for injecting gas into the ion transport tunnel.

15. A mass spectrometer comprising:

an ion source;

a mass analyser having ions entering at its inlet and selected ions exiting at its outlet; and

an ion collision cell receiving the selected ions from the mass analyser and facilitating ion collisions with gas molecules, the collision cell comprising an insulating plate with two surfaces, a plurality of conductive elements, each element having a cross-section configured for forming an electrode surface, wherein all of the conductive elements are attached to one surface of the insulating plate along their length, whereby the electrode surfaces of all of the elements define an ion transport tunnel.

16. The mass spectrometer of claim 15, wherein the plurality of elements comprises four elements.

17. The mass spectrometer of claims 15 or 16, further comprising a plurality of elongated seals provided at the periphery of the transport tunnel to thereby seal the entire length of the transport tunnel.

18. The mass spectrometer of claim 17, wherein the plurality of elongated seals comprise a plurality of thin flat strips.

19. The mass spectrometer of claims 17 or 18, wherein each of two adjacent electrode surfaces are separated by a gap of length g, and wherein each of the elongated seals is positioned behind a corresponding gap at a distance d of length greater than length g.

20. The mass spectrometer of any one of claims 17 to 19, further comprising a gas injection inlet enabling gas injection into the ion transport tunnel.

21. A method for fabricating an ion collision cell assembly, comprising:
    (a) obtaining an insulating plate having two surfaces;
    (b) obtaining a plurality of elongated conductive elements, each element having a cross-section configured for forming an electrode surface; and
    (c) attaching the plurality of elongated conductive elements to one surface of the insulating plate along the length of the conductive elements, such that the electrode surfaces of all of the elements define an ion transport tunnel.

22. The method of claim 21, further comprising inserting each of four elongated seals between two of the conductive elements so as to seal the transport tunnel over its length.

23. An ion collision cell substantially as hereinbefore described with reference to and as illustrated by Figures 2 to 5.

24. An ion collision cell assembly substantially as hereinbefore described with reference to and as illustrated by Figures 2 to 5.

25. A mass spectrometer substantially as hereinbefore described with reference to and as illustrated by Figures 2 to 5.

26. A method for fabricating an ion collision cell assembly substantially as hereinbefore described with reference to and as illustrated by Figures 2 to 5.

CLAIMS

1. An ion collision cell, comprising:

   an insulating plate having two surfaces;

   a plurality of conductive elements, each element having a cross-section configured for forming an electrode surface;

   wherein all of the elements are attached to one surface of the insulating plate along their length, whereby the electrode surfaces of all of the elements define an ion transport tunnel.

2. The ion collision cell of claim 1, wherein the plurality of elements comprises four elements.

3. The ion collision cell of claim 1, further comprising a plurality of elongated seals provided at the periphery of the transport tunnel to thereby seal most of or the entire length of the transport tunnel.

4. The ion collision cell of claim 3, wherein the plurality of elongated seals comprise a plurality of thin flat strips.

5. The ion collision cell of claim 3, wherein each of two adjacent electrode surfaces are separated by a gap of length g, and wherein each of the elongated seals is positioned behind a corresponding gap at a distance d of length greater than length g.

6. The ion collision cell of claim 3, further comprising a gas injection inlet enabling gas injection into the ion transport tunnel.

7. The ion collision cell of claim 1, wherein the insulating plate comprises a printed circuit board.

8. The ion collision cell of claim 7, further comprising pogo pins making electrical contact to each of the elements.

9. The ion collision cell of claim 1, wherein the conductive elements are curved and form an ion transport tunnel making 180 degrees turn.

10. The ion collision cell of claim 9, wherein the plurality of elements comprises four elements and the electrode surfaces define an ion transport tunnel having a square cross-section.

11. An ion collision cell assembly, comprising:
an insulating plate having two surfaces; and
four elongated conductive elements attached to one surface of the insulating plate along their length to thereby form an ion transport tunnel, wherein each of the conductive elements is curved such that the transport tunnel forms a 180 degree turn.

12. The assembly of claim 11, wherein the ion transport tunnel has a square cross-section.

13. The assembly of claim 11, further comprising four elongated seals, each provided between two of the conductive elements, thereby sealing the transport tunnel throughout its length.

14. The assembly of claim 13, further comprising gas inlet for injecting gas into the ion transport tunnel.

15. A mass spectrometer comprising:
an ion source;
a mass analyzer having ions entering at its inlet and selected ions exiting at its outlet; and
an ion collision cell receiving the selected ions from the mass analyzer and facilitating ion collisions with gas molecules, the collision cell comprising an insulating plate with two surfaces, a plurality of conductive elements, each element having a cross-section configured for forming an electrode surface, wherein all of the conductive elements are attached to one surface of the

insulating plate along their length, whereby the electrode surfaces of all of the elements define an ion transport tunnel.

16. The mass spectrometer of claim 15, wherein the plurality of elements comprises four elements.

17. The mass spectrometer of claim 15, further comprising a plurality of elongated seals provided at the periphery of the transport tunnel to thereby seal the entire length of the transport tunnel.

18. The mass spectrometer of claim 17, wherein the plurality of elongated seals comprise a plurality of thin flat strips.

19. The mass spectrometer of claim 17, wherein each of two adjacent electrode surfaces are separated by a gap of length g, and wherein each of the elongated seals is positioned behind a corresponding gap at a distance d of length greater than length g.

20. The mass spectrometer of claim 17, further comprising a gas injection inlet enabling gas injection into the ion transport tunnel.

21. A method for fabricating an ion collision cell assembly, comprising:

(a) obtaining an insulating plate having two surfaces;

(b) obtaining a plurality of elongated conductive elements, each element having a cross-section configured for forming an electrode surface; and

(c) attaching the plurality of elongated conductive elements to one surface of the insulating plate along the length of the conductive elements, such that the electrode surfaces of all of the elements define an ion transport tunnel.

22. The method of claim 21, further comprising inserting each of four elongated seals between two of the conductive elements so as to seal the transport tunnel over its length.