CLAIMS

1. A lens assembly for manipulating electron beamlets, comprising an electron-optical device for manipulating electron beamlets, the device comprising:

an array substrate in which an array of apertures is defined for the path of electron beamlets, the array substrate having a thickness which is stepped so that the array substrate is thinner in a first region comprising all apertures of the array of apertures than another region of the array substrate;

an adjoining substrate in which another array of apertures is defined for the path of the electron beamlets; and

a spacer disposed between the substrates to separate the substrates such that the opposing surfaces of the substrates are parallel to each other, the spacer having an inner surface that defines an opening for the path of the electron beamlets, wherein the inner surface faces the path of the beamlets, the spacer is in contact with the another region of the array substrate, and the first region of the array substrate is unsupported,

wherein the electron-optical device is configured to provide a potential difference between the substrates.

2. The lens assembly according to claim 1, wherein one of the array substrate and the adjoining substrate is upbeam of the other.

3. The lens assembly of claim 2, wherein the upbeam substrate has a higher potential difference relative to a reference potential than the downbeam substrate.

4. The lens assembly of claim 1 wherein a surface of the array substrate between the first region of the array substrate and the another region of the array substrate is orthogonal to the surface of the array substrate facing the adjoining substrate.

5. The lens assembly of claim 1, wherein the inner surface is shaped such that a creep path between the substrates over the inner surface is longer than a minimum distance between the substrates.

6. The lens assembly of claim 5, wherein the inner surface comprises corrugations.

7. The lens assembly of claim 1, wherein the array substrate comprises a first wafer in which the aperture array is defined, disposed in contact with the spacer; and
a second wafer disposed on a surface of the first wafer in a region not corresponding to the aperture array.

8. The lens assembly of claim 1, wherein the array substrate comprises a first wafer etched to generate the regions having different thicknesses.

9. The lens assembly of claim 1, wherein the inner surface is stepped with an upper beam portion distanced further away from the path of the beamlets than a lower beam portion.

10. The electron-optical device of claim 1, wherein a coating of 0.5 Ohms/square or lower is provided on the surface of at least one of the substrates.

11. The lens assembly of claim 1, wherein the array of apertures defined in the adjoining substrate has the same pattern as array of apertures defined in the array substrate.

12. The lens assembly of claim 1, further comprising a protective resistor configured to provide controlled discharge of stored electric charge in the lens to prevent damages.

13. The lens assembly of claim 12, further comprising a circuit board electrically connected to the array substrate or the adjoining substrate.

14. The lens assembly of claim 13, further comprising a connector configured to electrically connect the array substrate or the adjoining substrate to the circuit board; wherein the connector is surrounded by material of 25 kV/mm or greater.

15. The lens assembly of claim 1, further comprising a detector array configured to detect electrons emitted from the sample.