CLAIMS

1. An evaporator that is heated by an electron beam in vacuum, evaporates or sublimates a vapor-deposition material, and forms a lithium-containing compound coating on a surface of a substrate in transfer by codeposition, the evaporator comprising:

a hearth liner that includes a cooler; and

a plurality of liners that are accommodated in the hearth liner, each of which has the vapor-deposition material thereinside, wherein

each of the liners has a wall facing a surrounding member that serves as an adjacent liner or the hearth liner, and

the liners are disposed inside the hearth liner such that the wall comes into contact with the surrounding member in a heated state and such that the wall is separated from the surrounding member with a gap interposed therebetween in a non-heated state.

2. The evaporator according to claim 1, wherein

each of the liners is formed in a rectangular shape in plan view, and

the liners are disposed inside the hearth liner and adjacent to each other in a direction orthogonal to a movement direction of the substrate.

3. The evaporator according to claim 2, wherein

a material used to form each of the liners is a material that does not react with the vapor-deposition material in a heated state.

4. The evaporator according to claim 3, wherein

of the liners, a liner accommodating lithium as the vapor-deposition material is formed of tantalum.

5. The evaporator according to claim 3, wherein

of the liners, a liner accommodating the vapor-deposition material not containing lithium is formed of copper.

6. The evaporator according to claim 3, wherein

of the liners, a liner accommodating the vapor-deposition material containing lithium is formed of tantalum.

7. The evaporator according to claim 3, wherein

of the liners, a liner accommodating the vapor-deposition material containing lithium is formed of copper.

8. The evaporator according to any one of claims 1 to 7, wherein

of the liners, a liner formed of copper is disposed inside the hearth liner, and

in a non-heated state, a ratio of a size of the gap to an outer size of the liner is in a range of 0.0007 to 0.00839.

9. The evaporator according to any one of claims 1 to 7, wherein

of the liners, a liner formed of tantalum is disposed inside the hearth liner, and

in a non-heated state, a ratio of a size of the gap to an outer size of the liner is in a range of 0.0007 to 0.0032.

10. The evaporator according to any one of claims 1 to 7, wherein

of the liners, five liners formed of copper are disposed inside the hearth liner, and

in a non-heated state, a ratio of a sum of sizes of the gaps to a sum of outer sizes of the liners in a liner arrangement direction is in a range of 0.0035 to 0.042.

11. The evaporator according to any one of claims 1 to 7, wherein

of the liners, three liners formed of copper and two liners formed of tantalum are disposed inside the hearth liner, and

in a non-heated state, a ratio of a sum of sizes of the gaps to a sum of outer sizes of the liners in a liner arrangement direction is in a range of 0.0035 to 0.0316.

12. The evaporator according to any one of claims 1 to 7, wherein

of the liners, two liners formed of copper and three liners formed of tantalum are disposed inside the hearth liner, and

in a non-heated state, a ratio of a sum of sizes of the gaps to a sum of outer sizes of the liners in a liner arrangement direction is in a range of 0.0035 to 0.0264.

13. The evaporator according to any one of claims 1 to 7, wherein

of the liners, five liners formed of tantalum are disposed inside the hearth liner, and

in a non-heated state, a ratio of a sum of sizes of the gaps to a sum of outer sizes of the liners in a liner arrangement direction is in a range of 0.0035 to 0.016.

14. A deposition apparatus comprising:

a chamber in which a substrate is movable in vacuum;

a substrate transfer unit that transfers the substrate;

the evaporator according to any one of claims 1 to 13; and

an electron beam source that irradiates the evaporator with an electron beam.

5