CLAIMS

1. A film formation apparatus (10) comprising:

a transfer unit (11) that transfers a base member (F) having a deposition surface and a back surface;

a film formation unit (12) that forms an electrolyte film on a film formation region on the deposition surface of the base member (F) transferred by the transfer unit (11), the electrolyte film containing nitrogen and lithium;

an extraneous-material removal unit (14) that comes into contact with the electrolyte film on the deposition surface of the base member (F) transferred by the transfer unit (11) after film formation of the film formation unit (12) and thereby removes extraneous materials contained in the film formation region, the extraneous-material removal unit (14) being provided at a position that is a downstream side of the film formation unit (12) in a direction of movement of the base member (F); and

a film reformation unit (13) that reforms an electrolyte film on the film formation region on the deposition surface of the base member (F) transferred by the transfer unit (11) after removal of the extraneous materials by the extraneous-material removal unit (14), the film reformation unit (13) being provided at a position that is a downstream side of the extraneous-material removal unit (14) in the direction of movement of the base member (F), wherein

the transfer unit (11) includes a first main roller (113), a second main roller (114), and a transfer roller (116),

the transfer roller (116) comes into contact with the back surface of the base member (F) such that the base member (F) is wound around the transfer roller (116),

the film formation unit (12) includes a film-formation source (121) that emits a raw material toward the deposition surface of the base member (F) on the first main roller (113),

the film reformation unit (13) includes a film-formation source (131) that emits a raw material toward the deposition surface of the base member (F) on the second main roller (114), and

the transfer roller (116) is located in the transfer unit (11) so as to cause the base member (F) to be wound around the transfer roller (116) and causes the deposition surface

of the base member (F) having the electrolyte layer formed thereon to expand with respect to the back surface of the base member (F).

2. The film formation apparatus (10) according to claim 1 or claim 2, wherein

the extraneous-material removal unit (14) includes a contact portion,

the contact portion is located on an opposite side of the transfer roller (116) with the base member (F) interposed therebetween,

the contact portion comes into contact with the electrolyte film on the deposition surface of the base member (F) wound around the transfer roller (116) in a state of moving relative to the base member (F),

the contact portion is a roller (141) formed in a cylindrical shape, and

the roller (141) extends in an axis line intersecting with a transfer direction of the base member (F).

3. The film formation apparatus (10) according to claim 2, wherein

in the extraneous-material removal unit (14),

the back surface of the base member (F) comes into contact with the transfer roller (116) such that the base member (F) is wound around the transfer roller (116), and

a surface of the roller (141) comes into contact with the base member (F) in a state where a surface side of the electrolyte layer is extended as compared with a portion of the electrolyte layer close to the base member (F).

4. The film formation apparatus (10) according to claim 3, wherein

the contact portion is made of a foam resin material or a non-woven fabric.

5. The film formation apparatus (10) according to claims 2 or 3, wherein

the roller (141) has a cancellous or a rod-shaped portion that catches portions of the extraneous materials which protrude from a surface of the electrolyte layer, presses portions of the extraneous materials which are depressed from the surface of the electrolyte layer, and thereby separates the extraneous materials from the electrolyte layer,

the roller (141) rotates in a direction opposite to the transfer direction of the base member (F).

6. The film formation apparatus (10) according to claim 7, wherein

the roller (141) and the base member (F) are in contact with each other at a contact point of the contact portion, and

a tangential direction of the roller (141) which is along a rotational direction of the roller (141) when viewed from the contact point is opposite to the transfer direction of the base member (F).

7. The film formation apparatus (10) according to claim 6, wherein

the extraneous-material removal unit (14) includes a suction unit (142), and

the suction unit (142) includes:

a suction nozzle (142a) located close to the base member (F) with which the roller (141) comes into contact; and

a suction pump (142b) connected to the suction nozzle (142a).

8. The film formation apparatus (10) according to claim 1, wherein

in the film formation unit (12), plasma is generated in a region close to the first main roller (113),

in the film reformation unit (13), plasma is generated in a region close to the second main roller (114), and

the electrolyte layer is formed in which electrical conduction of the electrolyte layer in a film-thickness direction thereof due to the extraneous materials does not occur.

9. The film formation apparatus (10) according to claim 1, wherein

LiPON is formed as the electrolyte layer.