What is claimed is

1. An apparatus for securely processing biological sample, comprising:

at least one semi-permeable column, whereby the inner portion of which defines a first receiving space, the bottom of the first receiving space has at least one semi-permeable membrane, the top portion of the semi-permeable column has a first opening, and the bottom of the semi-permeable column has a first outlet;

a vacuum manifold, comprises:

a base, the interior of which defines a receiving space; and

a lid covering the base, comprising at least one slot, whereby the internal diameter of which is slightly larger than the outer diameter of the semi-permeable column, and the slot forms a through hole at the bottom thereof for communicating with the receiving space of the base;

at least one sealing element positioning at the bottom of the slot, and each of the sealing elements having an opening at its center, whereby when the semi-permeable column is inserted into the opening at the center of the sealing element, it can be secured in position, and when vacuum is applied to the vacuum manifold, air would not pass through between the first outlet and the sealing element.

2. An apparatus for securely processing biological sample, comprising:

at least one semi-permeable column, whereby the inner portion of which defines a first receiving space, the bottom of the first receiving space has at least one semi-permeable membrane, the top portion of the semi-permeable column has a first opening, and the bottom of the semi-permeable column has a first outlet;

a vacuum manifold, comprises:

a base, the interior of which defines a receiving space; and

a lid covering the base, comprising at least one slot, whereby the internal diameter of which is slightly larger than the outer diameter of the semi-permeable column, and the slot forms a through hole the bottom thereof for communicating with the receiving space of the base, and further forms at least one annular groove around the wall thereof;

at least one sealing element in the shape of an O-ring being inserted into the at least one annular groove around the wall of the slot, whereby the inner diameter of the sealing element is slightly smaller than the outer diameter of the semi-permeable column such that when the semi-permeable column is inserted into the slot, it can be secured in position, and when vacuum is applied to the vacuum manifold, air would not pass through between the semi-permeable column and the sealing element.

3. An apparatus for securely processing biological sample, comprising:

at least one semi-permeable column, whereby the inner portion of which defines a first receiving space, the bottom of the first receiving space has at least one semi-permeable membrane, the top portion of the semi-permeable column has a first opening and a flange extending radially and outwardly from the first opening, and the bottom of the semi-permeable column has a first outlet;

at least one adaptor column, whereby the interior of which defines a second receiving space, the top portion of which has a second opening and a second flange extending radially and outwardly from the second opening, the bottom portion of which has a second outlet protruding downwardly, the diameter of the second

receiving space is slightly larger than the outer diameter of the semi-permeable column, the second flange having a second sealing element fitting therearound such that when the semi-permeable is inserted into the adaptor column, the first flange will rest on the second sealing element;

a vacuum manifold, comprises:

a base, the interior of which defines a receiving space; and

a lid covering the base, comprising at least one slot, whereby the internal diameter of which is slightly larger than the outer diameter of the adaptor column, and the slot forms a through hole at the bottom thereof for communicating with the receiving space of the base;

at least one sealing element positioning at the bottom of the slot, and each of the sealing elements having an opening at its center, whereby when the adaptor column is inserted into the opening at the center of the sealing element, it can be secured in position, and when vacuum is applied to the vacuum manifold, air would not pass through between the second outlet and the sealing element, nor through between the first flange and the second sealing element.

4. An apparatus for securely processing biological sample, comprising:

at least one semi-permeable column, whereby the inner portion of which defines a first receiving space, the bottom of the first receiving space has at least one semi-permeable membrane, the top portion of the semi-permeable column has a first opening and a flange extending radially and outwardly from the first opening, and the bottom of the semi-permeable column has a first outlet;

at least one adaptor column, whereby the interior of which defines a second receiving space, the top portion of which has a second opening and a second flange extending radially and outwardly from the second opening, the bottom portion of which has a second outlet protruding downwardly, the diameter of the second receiving space is slightly larger than the outer diameter of the semi-permeable column, the second flange having a second sealing element fitting thereabout such that when the semi-permeable is inserted into the adaptor column, the first flange will rest on the second sealing element;

a vacuum manifold, comprises:

a base, the interior of which defines a receiving space; and

a lid covering the base, comprising at least one slot, whereby the internal diameter of which is slightly larger than the outer diameter of the adaptor column, and the slot forms a through hole at the bottom thereof for communicating with the receiving space of the base, and further forms at least one annular groove formed on the wall of the slot;

at least one sealing element in the shape of an O-ring being inserted into the at least one annular groove around the wall of the slot, whereby the inner diameter of the sealing element is slightly smaller than the outer diameter of the adaptor column such that when the adaptor column is inserted into the slot, it can be secured in position, and when vacuum is applied to the vacuum manifold, air would not pass through between the adaptor column and the sealing element and nor through between the first flange and the second sealing element.

CLAIMS

1. An apparatus for securely processing biological sample, comprising:

at least one semi-permeable column, whereby the inner portion of which defines a first receiving space, the bottom of the first receiving space has at least one semi-permeable membrane, the top portion of the semi-permeable column has a first opening and a flange extending radially and outwardly from the first opening, and the bottom of the semi-permeable column has a first outlet;

at least one adaptor column, whereby the interior of which defines a second receiving space, the top portion of which has a second opening and a second flange extending radially and outwardly from the second opening, the bottom portion of which has a second outlet protruding downwardly, the diameter of the second receiving space is merely slightly larger than the outer diameter of the semi-permeable column thereby allowing the semi-permeable column to be secured stably during operation, the second flange having a second sealing element fitting therearound such that when the semi-permeable is inserted into the adaptor column, the first flange will rest on the second sealing element;

a vacuum manifold, comprising:

a base, the interior of which defines a receiving space; and

a lid covering the base, comprising at least one slot, whereby the internal diameter of which is merely slightly larger than the outer diameter of the adaptor column thereby allowing the adaptor column to be secured stably during operation, and the slot forms a through hole at the bottom thereof for communicating with the receiving space of the base;

at least one sealing element positioned around the adaptor column and in the gap formed between the slot and the adaptor column such that when the adaptor column is inserted into the slot, it can be secured in position, and when vacuum is applied to the vacuum manifold, air would not pass through between the adaptor column and the sealing element, nor through between the first flange and the second sealing element.