Claims

1. A localised transdermal iontophoretic drug delivery system, wherein the system comprises:

(a) an electrode assembly array, wherein the electrode assembly array comprises a number of N electrode assemblies, and N≥3; and each electrode assembly compromises one electrode; and

(b) a number of M power sources, wherein the power supplies are used for supplying current to the corresponding electrodes or electrode pairs, wherein M is a positive integer from 1 to C (N, 2), wherein C (N, 2) represents a combination number of any 2 elements from N elements (C) or C_N^2;

wherein, at least two electrodes in the electrode assembly array are provided with a medium containing an electrically charged active agent, and the current pushes the active agent to the skin layer at a time period during which the current has the same polarity as the active agent,

and any electrode in the electrode array is connected to a half-bridge drive circuit (HBD) and is driven by the half-bridge drive circuit, wherein the half-bridge drive circuit further comprises: a current sensor arranged on the high voltage side; and/or a current sensor arranged on the low voltage side,

and the system is an electronic facial mask, and the contact surface formed by the contact layer of the electrode in the electrode assembly matrix is conformable to the external surface of the face.

2. The system of claim 1, wherein the M power sources are used for supplying power to the electrode assembly array in the following manner:

one or more power sources; and

multiple current drive assemblies.

3. The system of claim 1, wherein the power source simultaneously supplies current to the corresponding electrodes or electrode pairs.

4. The system of claim 1, wherein the power source can supply current to the corresponding electrode or electrode pair at different time periods.

5. The system of claim 1, wherein each electrode assembly described comprises a corresponding contact layer; wherein, the contact layer is used to store the medium containing an active agent and is connected with electrode fluid.

6. The system of claim 5, wherein the multiple electrodes share one contact layer.

7. The system of claim 1, wherein the external surface area of each electrode is: 0.5-50 cm^2.

8. The system of claim 1, wherein the electrode assembly array comprises:

an I electrode assembly pair or an I electrode assembly sub-array, which corresponds to the nose area of the face;

an II electrode assembly pair or an II electrode assembly sub-array, which corresponds to the forehead area of the face;

an IIIa electrode assembly pair or an IIIa electrode assembly sub-array, which corresponds to the left cheek area and the left chin area of the face; and

an IIIb electrode assembly pair or an IIIb electrode assembly sub-array, which corresponds to the right cheek area and the right chin area of the face.

9. The system of any one of claims 1-8, wherein half-bridge drive circuit comprises at least two transistors.

10. The system of claim 1, wherein the system further comprises: a switch matrix or a multiplexer, which is arranged between the power sources and the electrode assembly array.

11. The system of claim 1, wherein the system configures the electrodes of the electrode assembly array and/or controls the operating state of the electrodes based on the collected data of the face.

12. The system of claim 1, wherein the data is selected from the group consisting of skin moisture content, skin pH, sebum secretion content, skin damage, skin aging, skin roughness, skin bio-resistance analysis and a combination thereof.

13. The system of claim 1, wherein the electrode assembly array comprises:

an I electrode assembly pair or an I electrode assembly sub-array, which corresponds to the nose area of the face; and

an II electrode assembly pair or an II electrode assembly sub-array, which corresponds to the forehead area, cheek area and chin area of the face; and

the I electrode assembly pair is in a non-array form; or

the I electrode assembly sub-array comprises ≥3 electrode assemblies.

14. The system of claim 1, wherein the electrode assembly array comprises:

an I electrode assembly pair or an I electrode assembly sub-array, which corresponds to the nose area of the face;

an II electrode assembly pair or an II electrode assembly sub-array, which corresponds to the forehead area of the face; and

an III electrode assembly pair or an III electrode assembly sub-array, which corresponds to the cheek area and the chin area of the face; and

the I electrode assembly pair, the II electrode assembly pair and the III electrode assembly pair are each independently in a non-array form; or

the I electrode assembly sub-array, the II electrode assembly sub-array and the III electrode assembly sub-array each independently comprise ≥3 electrode assemblies.

15. The system of claim 1, wherein the electrode assembly array comprises:

an I electrode assembly pair or an I electrode assembly sub-array, which corresponds to the nose area of the face;

an II electrode assembly pair or an II electrode assembly sub-array, which corresponds to the forehead area of the face;

an III electrode assembly pair or an III electrode assembly sub-array, which corresponds to the cheek area of the face; and

an IV electrode assembly pair or an IV electrode assembly sub-array, which corresponds to the chin area of the face； and

the I electrode assembly pair, the II electrode assembly pair, the III electrode assembly pair and the IV electrode assembly pair are each independently in a non-array form; or

the I electrode assembly sub-array, the II electrode assembly sub-array, the III electrode assembly sub-array and the IV electrode assembly sub-array each independently comprise ≥3 electrode assemblies.

16. The system of claim 1, wherein the electrode assembly array comprises:

an I electrode assembly pair or an I electrode assembly sub-array, which corresponds to the nose area of the face;

an II electrode assembly pair or an II electrode assembly sub-array, which corresponds to the forehead area of the face;

an IIIa electrode assembly pair or an IIIa electrode assembly sub-array, which corresponds to the left cheek area of the face;

an IIIb electrode assembly pair or an IIIb electrode assembly sub-array, which corresponds to the right cheek area of the face; and

an IV electrode assembly pair or an IV electrode assembly sub-array, which corresponds to the chin area of the face; and

the I electrode assembly pair, the II electrode assembly pair, the IIIa electrode assembly pair, the IIIb electrode assembly pair and the IV electrode assembly pair are each independently in a non-array form; or

the I electrode assembly sub-array, the II electrode assembly sub-array, the IIIa electrode assembly sub-array, the IIIb electrode assembly sub-array and the IV electrode assembly sub-array each independently comprise ≥3 electrode assemblies.

17. A localised transdermal iontophoretic drug delivery method, comprising the steps of: using the localised transdermal iontophoretic drug delivery system of claim 1 to perform transdermal iontophoretic drug delivery.

18. The method of claim 17, wherein the method is a non-therapeutic method.

19. The method of claim 17, wherein the localised transdermal iontophoretic drug delivery method is performed on inanimate objects or bodies.