CLAIMS

1. A two-terminal device, including a substrate comprising:

a first cell having a first characteristic resistance, and a second cell, spaced apart from the first cell along a web direction of the substrate, having a second characteristic resistance;

a first terminal and a second terminal, each terminal being formed towards or at opposing edges of the substrate across a transverse direction, and each terminal being in electrical communication with the first cell and the second cell;

a connecting portion, between the first cell and the second cell, the connecting portion providing electrical connectivity between the first cell and the second cell, and having a third characteristic resistance;

wherein the third characteristic resistance is greater than ~~or equal to at least one of~~ both the first characteristic resistance and the second characteristic resistance, such that an electrical charge from the first or second cell is extractable at the first terminal or the second terminal in preference to transferring between the first cell and the second cell across the connecting portion.

~~2. A two-terminal device according to claim 1, wherein the third characteristic resistance is greater than at least one of the first characteristic resistance and the second characteristic resistance.~~

~~3~~2. A two-terminal device according to claim ~~2~~1, wherein the third characteristic resistance is at least two times, preferably at least five times, most preferably at least ten times, greater than at least one of the first characteristic resistance and the second characteristic resistance.

~~3~~4. A two-terminal device according to any preceding claim, wherein the connecting portion comprises at least one resistive element and, preferably, ~~.~~

~~5. A two-terminal device according to claim 4,~~ wherein the at least one resistive element comprises a peak of the substrate~~, a discontinuous non-insulating coating of the substrate,~~ and/or a rutted portion of the substrate.

~~4~~6. A two-terminal device according to claim ~~4~~3 ~~or claim 5~~, wherein the at least one resistive element comprises a channel in the substrate and, preferably, ~~.~~

wherein the channel is formed as a depression, an indentation or an etch in the substrate.

5. A two-terminal device according to any preceding claim, wherein the first cell comprises at least one first groove and / or the second cell comprises at least one second groove, wherein the at least one first groove and / or the at least one second groove is at least partially filled with a third material comprising a perovskite structured material.

6. A two-terminal device according to claim 5, wherein the at least one first groove and/or the at least one second groove may be coated with a first material on a first face, and/or may be coated with a second material on a second face.

7. A two-terminal device according to claim 6, wherein the third material contacts the first material on the first face and/or the second material coated on the second face.

8. A two-terminal device according to claim 6 or claim 7, wherein the first material comprises a non-insulating material and, preferably, the first material comprises a conductor material, a semiconductor material, an electron transfer layer, or a combination thereof.

9. A two-terminal device according to any of claims 6 to 8, wherein the second material comprises a non-insulating material and, preferably, a conductor material, a semiconductor material, a hole transport layer, or a combination thereof.

10. A two-terminal device according to any of claims 5 to 9, wherein the perovskite structured material has a general chemical structure of ABX_3, where A and B are two different cations of different sizes, and X is an anion that chemically bonds to both A and B.

11. A two-terminal device according to claim 10, wherein the perovskite structured material has an optical bandgap between 1.1eV and 2.5eV.

~~7. A two-terminal device according to claim 6, wherein the first cell comprises at least one first groove and/or the second cell comprises at least one second groove, and wherein the channel transects a portion of the at least one first groove and/or a portion of the at least one second groove.~~

~~8~~12. A two-terminal device according to claim ~~4~~ 6, wherein the first cell comprises a first series of grooves and/or the second cell comprises a second series of grooves, wherein the channel transects a portion of the first series of grooves and/or a portion of the second series of grooves and, preferably, ~~.~~

~~9. A two-terminal device according to claim 8,~~ wherein the channel transects the first series of grooves and/or the second series of grooves towards an end of each groove.

~~10~~13. A two-terminal device according to claim 3~~4 or claim 5~~, wherein the at least one resistive element comprises a plurality of channels in the substrate.

~~11. A two-terminal device according to claim 10, wherein the first cell comprises at least one groove and/or the second cell comprises at least one second groove, wherein each channel transects the at least one first groove and/or the at least one second groove.~~

~~12~~14. A two-terminal device according to claim ~~10~~13, wherein the first cell comprises a first series of grooves and/or the second cell comprises a second series of grooves, and wherein each channel of the plurality of channels transects a portion of the first series of grooves and/or a portion of the second series of grooves and, preferably, ~~.~~

~~13. A two-terminal device according to claim 12,~~ wherein each channel transects the first series of grooves and/or the second series of grooves towards an end of each groove.

~~14~~15. A two-terminal device according to ~~any one of~~ claim~~s~~ ~~10~~ 13 or claim 14~~to 13~~, wherein the plurality of channels comprises a first channel, having a first channel characteristic resistance, and a second channel, having a second channel characteristic resistance, wherein the first channel characteristic resistance and the second channel characteristic resistance provide substantially all of the third characteristic resistance and, preferably, ~~.~~

~~15. A two-terminal device according to claim 14,~~ wherein the plurality of channels further comprises a third channel, having a third channel characteristic resistance, wherein the first channel characteristic resistance, the second channel characteristic resistance and the third channel characteristic resistance provide substantially all of the third characteristic resistance.

~~16~~16. A two-terminal device according to claim 4 or any ~~one~~ of claims 12~~6~~ to ~~15~~15, wherein the channel or each channel of the plurality of channels is substantially Z-shaped having a predetermined angle.

~~17. A two-terminal device according to claim 10, wherein the first cell comprises at least one first groove and the second cell comprises at least one second groove, the substrate further comprising:~~

~~a first transection channel that transects each channel of the plurality of channels at their distal ends and transects the at least one first groove;~~

~~a second transection channel that transects each channel of the plurality of channels at their proximal ends and transects the at least one second groove.~~

~~18~~17. A two-terminal device according to claim 4 or any of claims 12~~10~~ to 16, wherein the first cell comprises a first series of grooves and the second cell comprises a second series of grooves, the substrate further comprising:

a first transection channel that transects each channel of the plurality of channels at their distal ends and transects a portion of the first series of grooves; and

a second transection channel that transects each channel of the plurality of channels at their proximal ends and transects a portion of the second series of grooves.

~~19~~18. A two-terminal device according to claim 17~~17 or claim 18~~, wherein the first transection channel and/or the second transection channel transect the respective groove or grooves towards an end of each groove.

~~20. A two-terminal device according to any one of claims 17 to 19, wherein the plurality of channels comprise a first channel and a second channel, wherein the first transection channel transects the first channel and the second channel at their distal ends, and wherein the second transection channel transects the first channel and the second channel at their proximal ends; and, optionally, the plurality of channels further comprises a third channel, wherein the first transection channel further transects the third channel at its distal end, and wherein the second transection channel further transects the third channel at its proximal end.~~

~~21~~19. A two-terminal device according to ~~any one of~~ claim~~s 17~~ 17 or claim 18~~to 20~~, wherein each channel, the first transection channel and the second transection channel form a substantial Z-shape having a predetermined angle.

~~22. A two-terminal device according to any one of claims 6 to 21, wherein the channel or one of more of the plurality of channels comprises a rutted-base, a rutted-wall and/or a non-conductive electrical insulator material therein.~~

~~23~~20. A two-terminal device according to claim 4 of any ~~one~~ of claims ~~6~~ 12 to~~to~~ ~~22~~19, wherein the channel or one or more of the plurality of channels has an aspect ratio of at least 1:1.6.

~~24~~21. A method of forming a two-terminal device, comprising:

- providing a substrate;
- forming a first cell within the substrate, the first cell having a first characteristic resistance;
- forming a second cell within the substrate, spaced apart from the first cell along the web direction of the substrate, the second cell having a second characteristic resistance;

- forming a first terminal and a second terminal, each terminal being formed towards or at opposing edges of the substrate across the web direction, one or each terminal being formed in electrical connection with the first cell and the second cell;
- forming a connecting portion, between the first cell and the second cell, the connecting portion providing electrical connectivity between the first cell and the second cell, and having a third characteristic resistance

wherein the third characteristic resistance is greater than ~~or equal to at least one of~~ both the first characteristic resistance and the second characteristic resistance, such that an electrical charge from the first or second cell is extracted at the first terminal or the second terminal in preference to transferring from the first cell to the second cell across the connecting portion.

~~25~~22. A method according to claim ~~24~~21, wherein:
- the step of forming a first cell comprises forming a first series of grooves within the substrate;
- the step of forming a second cell comprises forming a second series of grooves within the substrate; and
- the step of forming a connecting portion comprises forming at least one channel within the connecting portion;

the method further comprising:
- coating a first face of each groove of the first series of grooves, each groove of the second series of grooves and the or each channel with a first material;
- coating a second face of each groove of the first series of grooves, each groove of the second series of grooves and the or each channel with a second material; and
- at least partially filling each groove of the first series of grooves, each groove of the second series of grooves and the or each channel with a third material.

~~23.~~ A method according to claim 21, wherein:
- the method further comprising at least partially filling each groove of the first series of grooves and the second series of groove with a perovskite structured material, thereby providing an electrical connection across each groove of the first series of grooves, and an electrical connection across each groove of the second series of grooves.