Claims

1. An interdigitated back contact photovoltaic device comprising:

- a silicon-based substrate being of a p-type or n-type doping and having a first face defining a horizontal X-Y plane and a vertical direction Z orthogonal to said horizontal X-Y plane;
- a patterned silicon layer comprising a plurality of first-type structures, being p-type or n-type doped structures, and a plurality of second-type structures, being of the type opposite to said first-type, said first-type structures and second-type structures being of an alternating polarity type,

wherein

said silicon-based substrate, comprising said patterned silicon layer, is divided in a first portion and a second portion, the intersection of the two portions defining a virtual separation axis comprising a device center,

said first portion comprises, arranged on said first-type structures and second type structures, a plurality of electrical contacts aligned as a first series of parallel first columns defining alternating positive and negative polarities, said first columns being orthogonal to said virtual axis,

said first portion comprises, to its side away from said virtual axis, at least one corner that is not a rectangular corner,

said second portion comprises, arranged on said second-type structures and said first-type structures, a plurality of electrical contacts aligned as a second series of parallel second columns defining alternating negative and positive polarities, said second columns being orthogonal to said virtual axis, said second portion being identical to said first portion when virtually rotated, in said X-Y plane, by 180 degrees relative to said device center as virtual rotation center,

each of the electrical contacts of said first columns have, in the length orthogonal to said virtual axis, a polarity opposite to the polarity of the electrical contacts of a collinear second column,

said second portion comprises, to its side away from said virtual axis, at least one corner that is not a rectangular corner.

2. The photovoltaic device according to claim 1 wherein the number N of first columns and second columns are equal and/or is a pair number.

3. The photovoltaic device according to any one of claims 1 to 2 wherein at least a part of said first columns and at least a part of said second columns comprises an electrical connection layer connecting the electrical contacts.

4. The photovoltaic device according to any one of claims 1 to 3 wherein said electrical contacts are realized in apertures realized in a deposited layer comprising a plurality of isolating portions arranged onto said first type and second type of said patterned silicon layer.

5. The photovoltaic device according to claim 4 wherein said deposited layer is a fully insulating layer arranged onto said patterned silicon layer.

6. The photovoltaic device according to any one of claims 1 to 5 wherein said first and said second portions are separated by a gap area, extending in the direction of said virtual X-axis and having a width defined in the Y-axis orthogonal to said virtual X-axis.

7. A resized photovoltaic device being said first portion or said second portion as obtained by a physical separation, along said virtual axis X, in substantially two halves, of the photovoltaic device according to any one of claims 1 to 6.

8. A photovoltaic module comprising a plurality of adjacent resized photovoltaic devices according to claim 7 and which are arranged so that at least 80%, preferably at least 90% of said first or second column of each first resized photovoltaic device is on a virtual line defined by a second or first column of an adjacent second resized photovoltaic device and so that facing columns of adjacent resized photovoltaic device have opposite polarities.

9. The photovoltaic module according to claim 8 comprising a plurality of adjacent resized photovoltaic devices that are arranged so that at least one of said first columns of each first resized photovoltaic device is not facing a second column of an adjacent second resized photovoltaic device.

10. A method for manufacturing the photovoltaic device according to any one of claims 1 to 6 comprising the steps of:

- providing a patterned silicon layer, comprising a plurality of first -type structures, being p-type or n-type doped structures, and a plurality of second -type structures, being of the type opposite to said first-type and defining two identical portions being a first portion and a second portion separated by a virtual separation axis that includes a device center, said first and second portion comprising, to their side away from said virtual axis, at least one corner that is not a rectangular corner;

- realizing in said first portion, on said first-type structures and said second-type structures, a plurality of electrical contacts, arranged as a first series of parallel first columns of alternating positive and negative polarities in the direction of said virtual separation axis X;

- realizing in said second portion, on said second-type structures and said first-type structures, a plurality of electrical contacts, arranged as a second series of parallel second columns having alternating positive and negative polarities in the direction of said virtual separation axis X;

wherein:

- each of the electrical contacts of said first columns in said first portion have, in the length orthogonal to said virtual axis, a polarity opposite to the polarity of the electrical contacts of a facing second column in said second portion.

11. A method to realize resized photovoltaic cells comprising the steps of:
- realizing the photovoltaic device according to the method of claim 10;
- separating the photovoltaic device according to any one of claims 1 to 6 along the virtual axis X in two substantially identical resized photovoltaic devices.

12. The method according to claim 11 comprising the storage of a plurality of resized photovoltaic devices in a storage box.

13. A method for manufacturing the photovoltaic module according to claim 8 or 9 comprising the step of assembling photovoltaic devices in a way that columns of contacts are facing each other in a way that columns that are aligned in virtual lines represented by columns do have opposite polarities in an alternating way.

14. A method for manufacturing the photovoltaic module according to claim 8 or 9 by connecting columns of a first polarity of a resized photovoltaic device with columns of a second polarity, opposite to the first polarity, of an adjoining resized photovoltaic device and by that realizing an electrical series interconnection of the adjoining resized photovoltaic cells.