Claims

1. A method of forming a plurality of pn junctions in a semiconductor device (150, 250, 450), the method comprising:

providing a first substrate (351, 261) and a second substrate (371, 251),

performing a chemical vapour deposition process (111, 112) so as to form a first crystalline semiconductor layer (152, 452) comprising a first pn junction (452p) of said semiconductor device (150, 250, 450) above said first substrate (351,261),

performing a molecular beam epitaxie process (131) so as to form a diluted nitrogen semiconductor material (154, 254, 372) as a second crystalline semiconductor layer comprising a second pn junction (453p) of said semiconductor device above said second substrate (371, 251), and

forming at least one further crystalline semiconductor material (156, 262,…265, 362,…365, 454) by performing at least one further chemical vapour deposition process, wherein said at least one further crystalline semiconductor layer comprises a further pn junction and wherein one or more of said at least one further semiconductor layer is formed above said second substrate prior to forming said second crystalline semiconductor layer (254),

wherein the first substrate bonds with the first crystalline semiconductor layer and the second substrate bonds with the second crystalline semiconductor layer.

2. The method of claim 1, further comprising providing a substrate (151) and forming said first and second crystalline semiconductor layers above said substrate.

3. The method of claim 2, wherein each semiconductor layer (152,…156) is formed above said substrate.

4. The method of claim 1, wherein said first semiconductor layer (152) is formed prior to forming said second semiconductor layer (154).

5. The method of claim 1, further comprising providing a further substrate (361) and forming at least one of said at least one further semiconductor layers (362,…,365) above said further substrate (361).

6. The method of any one of claims 1 to 5, wherein at least said second semiconductor layers is formed as a III-V semiconductor compound.

7. The method of any one of claims 1 to 6, wherein the semiconductor device is a solar cell.

Claims

1. A method of forming a plurality of pn junctions in a semiconductor device, the method comprising:

providing a first substrate and a second substrate,

performing a chemical vapour deposition process so as to form a first crystalline semiconductor layer comprising a first pn junction of said semiconductor device above said first substrate,

performing a molecular beam epitaxie process so as to form a diluted nitrogen semiconductor material as a second crystalline semiconductor layer comprising a second pn junction of said semiconductor device above said second substrate, and

forming at least one further crystalline semiconductor material by performing at least one further chemical vapour deposition process, wherein said at least one further crystalline semiconductor layer comprises a further pn junction and wherein one or more of said at least one further semiconductor layer is formed above said second substrate prior to forming said second crystalline semiconductor layer,

wherein the first substrate bonds with the first crystalline semiconductor layer and the second substrate bonds with the second crystalline semiconductor layer, and

wherein the first substrate with the first semiconductor layer and the second substrate with the second semiconductor layer form a stacked layer configuration by performing a bonding process.

2. The method of claim 1, further comprising providing a substrate and forming said first and second crystalline semiconductor layers above said substrate.

3. The method of claim 2, wherein each semiconductor layer is formed above said substrate.

4. The method of claim 1, wherein said first semiconductor layer is formed prior to forming said second semiconductor layer.

5. The method of claim 1, further comprising providing a further substrate and forming at least one of said at least one further semiconductor layers above said further substrate.

6. The method of any one of claims 1 to 5, wherein at least said second semiconductor layers is formed as a III-V semiconductor compound.

7. The method of any one of claims 1 to 6, wherein the semiconductor device is a solar cell.