the semiconductor wafer **300**. The semiconductor wafer **300** produced according to the process described in connection with FIGS. **9** to **13**, is further subjected to additional doping by boron, for example, on the back surface **303**, to increase the doping concentration underlying the back surface. In the embodiment shown in FIG. **14**, substantially the entire back surface **303** is subjected to this additional doping to form an isotype junction **320**, which acts as a back side current collecting area for the solar cell apparatus. Again, doping may be achieved using diffusion or other conventional methods as described above in connection with FIG. **9** to FIG. **13**.

[0160] Referring to FIG. **15**, in an alternative embodiment for forming the second doped volume **307**, doping may be selectively applied to produce a third region **321** and a plurality of fourth regions **322**, where a dopant concentration in the fourth regions is higher than a dopant concentration in he third regions. Each fourth region has a corresponding fourth exposed area **324** which facilitates ohmic connection to the fourth regions **322**, as described above. The fourth exposed areas **324** may be distributed across the back surface **303** similar to the distribution of the second areas **128** shown in FIGS. **2-5**, thus facilitating contact by the second electrode **196** shown in FIG. **7** and FIG. **8**.

[0161] While specific embodiments of the invention have been described and illustrated, such embodiments should be considered illustrative of the invention only and not as limiting the invention.

What is claimed is:

1. A semiconductor apparatus comprising:

a first doped volume of semiconductor material, said first doped volume having a front surface and first and second adjacent regions;

said first region having a first concentration of dopant and a first exposed area on said front surface;

said second region having a second concentration of dopant and a second exposed area on said front surface, said second concentration being higher than said first concentration; and

a first external conductor; and

an alloy bonding said first external conductor to said second exposed area to ohmically connect said conductor to said second region.

2. The apparatus of claim **1** wherein said first region has a sheet resistance in the range of between about 80 ohms/sq to about 150 ohms/sq.

3. The apparatus of claim **1** wherein second region has a sheet resistance in the range of between about 0.5 ohms/sq to about 40 ohms/sq.

4. The apparatus of claim **1** wherein said second region comprises a plurality of separate second regions, each of said separate second regions generally having a concentration of dopant approximately equal to said second concentration and each of said separate second regions having a respective second exposed surface.

5. The apparatus of claim **4** wherein said first external conductor is bonded to said second exposed areas of at least two of said plurality of second regions.

6. The apparatus of claim **4** wherein said regions of said plurality of second regions are distributed across said front surface.

7. The apparatus of claim **4** wherein said regions of said plurality of second regions are distributed across said front surface in parallel spaced apart rows.

8. The apparatus of claim **7** wherein said regions in a first parallel spaced apart row are staggered relative to said regions in a second adjacent parallel row.

9. The apparatus of claim **7** wherein said first external conductor comprises a plurality of conductors, each of said plurality of conductors being bonded to a plurality of said second exposed areas of respective said second regions in one of said plurality of parallel rows.

10. The apparatus of claim **1** wherein said first external conductor comprises at least one of silver, copper, and alloys thereof.

11. The apparatus of claim **1** wherein said first external conductor comprises a wire having a diameter of between about 30 microns and about 200 microns.

12. The apparatus of claim **1** wherein said first external conductor comprises at least a portion having a cross sectional shape that is generally circular or generally rectangular or generally triangular.

13. The apparatus of claim **1** wherein a portion of said first external conductor is adhered to a polymeric film and wherein said polymeric film is adhered to said front surface.

14. The apparatus of claim **13** wherein said polymeric film comprises polyester.

15. The apparatus of claim **13** wherein said polymeric film has a thickness of between about 6 microns and about 100 microns.

16. The apparatus of claim **13** further comprising an adhesive between said polymeric film and said front surface, said adhesive being operable to adhere said polymeric film to said front surface.

17. The apparatus of claim **16** wherein said adhesive has thermoplastic properties.

18. The apparatus of claim **16** wherein said adhesive becomes fluid when subjected to a temperature in the range of between about 60 degrees Celsius and about 170 degrees Celsius.

19. The apparatus of claim **16** wherein said adhesive becomes fluid when subjected to a temperature in the range of between about 80 degrees Celsius and about 150 degrees Celsius.

20. The apparatus of claim **16** wherein said adhesive has a thickness of between about 20 microns and about 200 microns.

21. The apparatus of claim **1** wherein said alloy comprises a composition comprising at least two of: Ag, Bi, Cd, Ga, In, Pb, Sb, Sn, and Zn.

22. The apparatus of claim **20** wherein said alloy comprises In, Sn, and Ag in a proportion of about 47% In, about 51% Sn, and about 2% Ag.

23. The apparatus of claim **20** wherein said alloy comprises In and Sn in a proportion of about 48% In and about 52% Sn.

24. The apparatus of claim **1** wherein said alloy has a thickness of between about 1 micron and about 5 microns.

25. The apparatus of claim **1** wherein said alloy has a melting temperature of between about 30 degrees Celsius and about 200 degrees Celsius.

26. The apparatus of claim **1** wherein said alloy has a melting temperature of between about 60 degrees Celsius and about 150 degrees Celsius.

27. The apparatus of claim **1** further comprising a layer of dielectric material between said alloy and said second exposed area, said layer of dielectric material being operable to passivate said second exposed area and being sufficiently