What is claimed:

1. An optoelectronic device comprising:
   - a surface having a nonplanar topography; and
   - a conformal barrier coating provided on the surface in a manner effective to conform to said nonplanar topography, wherein the barrier coating comprises discrete, inorganic, crystalline domains dispersed in an inorganic amorphous matrix.

2. The optoelectronic device of claim 1, wherein the device comprises an electronic grid electrically coupled to a transparent electrode layer, wherein at least portions of the electronic grid and the transparent electrode layer define at least a portion of the surface on which the conformal barrier coating is provided.

3. The optoelectronic device of any preceding claim, wherein the device comprises a photoelectrically active region that comprises a photoelectrically active material comprising copper and indium.

4. The optoelectronic device of claim 1, wherein the surface has a topography comprising a plurality of basin regions, raised plateau regions, and wall regions.

5. The optoelectronic device of claim 1, wherein the surface comprises at least one first electrically conductive feature and at least one second electrically conductive feature.

6. The optoelectronic device of claim 1, wherein the conformal barrier coating comprises an oxide of tin that optionally is doped with fluorine.

7. The optoelectronic device of claim 1, wherein at least 50 volume percent of the conformal barrier coating is amorphous.

8. The optoelectronic device of claim 1, wherein the conformal barrier coating has a volume percent ratio of amorphous content to crystalline content in the range from 1:1 to 10:1.

9. The optoelectronic device of claim 1, wherein s at least 30 volume percent of the crystalline domains of the barrier coating have a size in the range from 2 nm to 10 nm.

10. The optoelectronic device of claim 1, wherein the barrier coating has a resistivity of 10^{-1} Ohm-cm or less.

11. The optoelectronic device of claim 1, wherein the barrier coating has a light transmittance from 300 nm to 1400 nm as deposited of at least 75%.

12. The optoelectronic device of claim 1, wherein the barrier coating has a thickness in the range from 150 nm to 1000 nm.

13. A method of making an optoelectronic device, comprising the steps of:

- providing an optoelectronic substrate comprising a photoelectrically active region, at least first and second electrode layers electrically coupled to the photoelectrically active region wherein at least the first electrode layer is at least partially transparent to visible light, and an electrically conductive grid electrically coupled to the first electrode layer, and wherein the first electrode layer and the electrically conductive grid define a nonplanar surface;
- forming a conforming inorganic, barrier coating on the nonplanar surface, wherein the barrier coating comprises discrete, inorganic, crystalline domains dispersed in an inorganic amorphous matrix.

14. The method of claim 13, wherein the forming step comprises sputtering one or more targets onto the surface, wherein at least one of said targets comprises an oxide of tin, and wherein the surface is at a temperature of 150°C or less.

CLEAN CLAIMS

1. An optoelectronic device comprising:

- a surface having a nonplanar topography such that at least first and second surface portions of the surface meet at one or more junctures; and
- a conformal barrier coating provided on the surface in a manner effective to conform to said surface portions and said juncture, wherein the barrier coating comprises discontinuous inorganic, crystalline domains dispersed and embedded in an inorganic amorphous matrix.

2. The optoelectronic device of claim 1, wherein the device comprises an electronic grid electrically coupled to a transparent electrode layer, wherein at least portions of the electronic grid and the transparent electrode layer define at least a portion of the surface on which the conformal barrier coating is provided.

3. The optoelectronic device of any preceding claim, wherein the device comprises an absorbing region that comprises a photoelectrically active material comprising copper and indium.

4. The optoelectronic device of any preceding claim, wherein the surface has a topography comprising a plurality of junctures, said junctures comprising a plurality of inside corners and a plurality of outside corners.

5. The optoelectronic device of any preceding claim, wherein the surface comprises a plurality of junctures provided at least in part by at least one first electrically conductive feature and at least one second electrically conductive feature.

6. The optoelectronic device of any preceding claim, wherein the conformal barrier coating comprises an oxide of tin that optionally is doped with fluorine.

7. The optoelectronic device of any preceding claim, wherein at least 50 volume percent of the conformal barrier coating is amorphous.

8. The optoelectronic device of any one of claims 1-6 wherein the conformal barrier coating has a volume percent ratio of amorphous content to crystalline content in the range from 1:1 to 10:1.

9. The optoelectronic device of claim 7 or 8, wherein a major portion of the crystalline domains of the barrier coating have a size in the range from 2 nm to 10 nm.

10. The optoelectronic device of any preceding claim, wherein the barrier coating has a resistivity of 10^{-1} Ohm-cm or less.

11. The optoelectronic device of any preceding claim, wherein the barrier coating has a light transmittance from 300 nm to 1400 nm as deposited of at least 75%.

12. The optoelectronic device of any preceding claim, wherein the barrier coating has a thickness in the range from 150 nm to 1000 nm.

13. A method of making an optoelectronic device, comprising the steps of:

- providing an optoelectronic substrate comprising an absorber region, at least first and second electrode layers electrically coupled to the absorber region wherein at least the first electrode layer is at least partially transparent to visible light, and an electrically conductive grid electrically coupled to the first electrode layer, and wherein the first electrode layer and the electrically conductive grid define a surface comprising a plurality of surface portions that meet at one or more junctures;
- forming a conforming inorganic, barrier coating on the surface, wherein the barrier coating comprises discontinuous, inorganic, crystalline domains dispersed and embedded in an inorganic amorphous matrix.

14. The method of claim 13, wherein the forming step comprises sputtering one or more targets onto the surface, wherein at least one of said targets comprises an oxide of tin, and wherein the surface is at a temperature of 150°C or less.