WHAT IS CLAIMED IS:

1. A composite article comprising:

at least one high integrity protective coating, said high integrity protective coating comprising at least one organic-inorganic composition barrier coating layer and at least one planarizing layer.

2. The composite article of claim 1, wherein the planarizing layer thickness is in the range of about 1 nanometer to about 100 microns.

3. The composite article of claim 2, wherein the planarizing layer thickness is in the range of about 100 nanometer to about 10 micron.

4. The composite article of claim 3, wherein the planarizing layer thickness is in the range of about 500 nm to about 5 microns.

5. The composite article of claim 1, further comprising a substrate.

6. The composite article of claim 5, wherein said substrate with said high integrity protective coating exhibits an R_a value less than about 4 nanometers.

7. The composite article of claim 5, wherein said substrate with said high integrity protective coating exhibits an R_a value less than about 2 nanometers.

8. The composite article of claim 5, wherein said substrate with said high integrity protective coating exhibits an R_a value less than about 0.75 nanometers.

9. The composite article of claim 5, wherein said substrate with said leveling coating exhibits an R_p value less than about 5.5 nanometers.

10. The composite article of claim 5, wherein said substrate with said high integrity protective coating has an oxygen transmission rate of less than about 0.1 $cm^3/(m^2day)$, as measured at 25° C. and with a gas containing 21 volume-percent oxygen.

11. The composite article of claim 5, wherein said substrate with said high integrity protective coating has a water vapor transmission rate of less than about 1x 10^{-2} g/(m^2day), as measured at 25° C and with a gas having 100-percent relative humidity.

12. The composite article of claim 5, wherein said substrate with said high integrity protective coating has a light transmittance greater than 85% in a selected wavelength range between about 400 nanometers to about 700 nanometers.

13. The composite article of claim 5, wherein the substrate is polycarbonate.

14. The composite article of claim 1, wherein the planarizing layer comprises a resin based composition.

15. The composite article of claim 14, wherein said planarizing layer comprises an epoxy resin based composition.

16. The composite article of claim 1, wherein said planarizing layer comprises an acrylic resin based composition.

17. The composite article of claim 1, wherein said planarizing layer further comprises a flexibilizing agent.

18. The composite article of claim 1, wherein said planarizing layer further comprises an UV catalyst.

19. The composite article of claim 1, wherein said planarizing layer further comprises a surfactant.

20. The composite article of claim 1, wherein said planarizing layer comprises a UV radiation cured composition.

21. The composite article of claim 1, wherein said planarizing layer comprises a thermally cured composition.

22. The composite article of claim 1, wherein said high integrity protective coating is disposed over at least one surface of said substrate.

23. The composite article of claim 1, wherein said high integrity protective coating encapsulates said substrate.

24. The composite article of claim 1, wherein at least one high integrity protective coating is disposed over at least one surface of at least one element of the composite article.

25. The composite article of claim 1, wherein at least one high integrity protective coating encapsulates the composite article.

26. The composite article of claim 1, wherein at least one high integrity protective coating encapsulates at least one element of the composite article.

27. The composite article of claim 1, wherein at least one element is an optoelectronic element.

28. The composite article of claim 1, wherein the optoelectronic element is an organic element.

29. The composite article of claim 1, wherein the optoelectronic element is electroluminescent.

30. The composite article of claim 1, wherein the optoelectronic element is photoresponsive.

31. A method for depositing a high integrity protective coating, comprising the steps of:

preparing a substantially homogenous resin based planarizing layer composition;

providing at least one surface for deposition;

depositing said planarizing layer composition on said surface;

curing said planarizing layer composition:

depositing reaction or recombination products of reacting species on the planarizing layer; and

changing the composition of the reactants fed into the reactor chamber during deposition to form an organic-inorganic composition barrier coating layer.

32. The method of claim 31, wherein said preparing is mixing a composition comprising at least one resin.

33. The method of claim 32. wherein said resin is an epoxy based resin.

34. The method of claim 32, wherein said resin is an acrylic based resin.

35. The method of claim 31, wherein said composition further comprising at least one of flexibilizing agent, adhesive promoter, surfactant or catalyst.

36. The method of claim 31, wherein said depositing is selected from the group consisting of spin coating, dip coating, lithographic process, langmuir press and flash evaporation reverse roll coating, wire-wound coating, Mayer rod coating, direct gravure coating, offset gravure coating, slot die coating, blade coating, hot melt coating, curtain coating, knife over roll coating, extrusion, air knife coating, spray, rotary screen coating, multilayer slide coating, coextrusion, meniscus coating, microgravure coating and combinations thereof.

37. The method of claim 31, wherein said curing is thermal curing.

38. The method of claim 31, wherein said radiation curing is ultraviolet curing.

CLAIMS

1. A composite article comprising:

at least one high integrity protective coating, said high integrity protective coating comprising at least one organic-inorganic composition barrier coating layer and at least one planarizing layer, wherein the barrier coating layer comprises a substantially organic zone and a substantially inorganic zone and an organic-inorganic interface zone between the substantially organic zone and the substantially inorganic zone.

2. The composite article of claim 1, wherein the planarizing layer thickness is in the range of about 1 nanometer to about 100 microns.

3. The composite article of claim 2, wherein the planarizing layer thickness is in the range of about 100 nanometer to about 10 micron.

4. The composite article of claim 3, wherein the planarizing layer thickness is in the range of about 500 nm to about 5 microns.

5. The composite article of claim 1, further comprising a substrate.

6. The composite article of claim 5, wherein said substrate with said high integrity protective coating exhibits an R_a value less than about 4 nanometers.

7. The composite article of claim 5, wherein said substrate with said high integrity protective coating exhibits an R_a value less than about 2 nanometers.

8. The composite article of claim 5, wherein said substrate with said high integrity protective coating exhibits an R_a value less than about 0.75 nanometers.

9. The composite article of claim 5, wherein said substrate with said leveling coating exhibits an R_p value less than about 5.5 nanometers.

10. The composite article of claim 5, wherein said substrate with said high integrity protective coating has an oxygen transmission rate of less than about 0.1 $cm^3/(m^2day)$, as measured at 25° C. and with a gas containing 21 volume-percent oxygen.

11. The composite article of claim 5, wherein said substrate with said high integrity protective coating has a water vapor transmission rate of less than about 1 x 10^{-2} g/(m^2day), as measured at 25° C and with a gas having 100-percent relative humidity.

12. The composite article of claim 5, wherein said substrate with said high integrity protective coating has a light transmittance greater than 85% in a selected wavelength range between about 400 nanometers to about 700 nanometers.

13. The composite article of claim 5, wherein the substrate is polycarbonate.

14. The composite article of claim 1, wherein the planarizing layer comprises a resin based composition.

15. The composite article of claim 14, wherein said planarizing layer comprises an epoxy resin based composition.

16. The composite article of claim 1, wherein said planarizing layer comprises an acrylic resin based composition.

17. The composite article of claim 1, wherein said planarizing layer further comprises a flexibilizing agent.

18. The composite article of claim 1, wherein said planarizing layer further comprises a surfactant.

19. The composite article of claim 1, wherein said planarizing layer comprises a UV radiation cured composition.

20. The composite article of claim 1, wherein said planarizing layer comprises a thermally cured composition.

21. The composite article of claim 1, wherein said high integrity protective coating is disposed over at least one surface of said substrate.

22. The composite article of claim 1, wherein said high integrity protective coating encapsulates said substrate.

23. The composite article of claim 1, wherein at least one high integrity protective coating is disposed over at least one surface of at least one element of the composite article.

24. The composite article of claim 1, wherein at least one high integrity protective coating encapsulates the composite article.

25. The composite article of claim 1, wherein at least one high integrity protective coating encapsulates at least one element of the composite article.

26. The composite article of claim 1, wherein at least one element is an optoelectronic element.

27. The composite article of claim 1, wherein the optoelectronic element is an organic element.

28. The composite article of claim 1, wherein the optoelectronic element is electroluminescent.

29. The composite article of claim 1, wherein the optoelectronic element is photoresponsive.

30. A composite article, comprising:

a protective coating comprising:

a barrier coating layer comprising a substantially organic zone and a substantially inorganic zone and an organic-inorganic interface zone between the substantially organic zone and the substantially inorganic zone, and

a planarizing layer comprising an epoxy resin based composition and a flexibilizing agent.

31. The article as defined in claim 30, wherein the interface zone is a transition zone having a thickness that is in a range of from about 5 nanometers to about 30 nanometers.

32. The article as defined in claim 30, wherein the planarizing layer further comprises a UV catalyst, and the planarizing layer is UV radiation curable.

33. The article as defined in claim 32, wherein the protective coating further comprises one or more UV sensitive layers disposed between the planarizing layer and a substrate, and UV absorbers are disposed between the planarizing layer and the UV sensitive layers such that the planarizing layer can be exposed to UV light during its cure, while the UV absorbers protect the UV sensitive layers from the UV radiation during cure of the planarizing layer.