What is claimed is:

1. An optoelectronic module comprising:

an optoelectronic device mounted on a substrate; and

a transparent cover separated from the substrate by a spacer, wherein the spacer is composed of a material that is non-transparent to light emitted by or detectable by the optoelectronic device;

wherein sidewalls of the transparent cover are covered by a material that is non-transparent to light emitted by or detectable by the optoelectronic device.

2. The module of claim 1 further including an optical element on a surface of the transparent cover.

3. The module of claim 1 or claim 2 further including an optics assembly over an object-side of the transparent cover, wherein the optics assembly includes one or more lenses stacked over the transparent cover.

4. The module of any one of claims 1 - 3 wherein the non-transparent material covering the sidewalls of the transparent cover is the same material of which the spacer is composed.

5. The module of any one of claims 1 - 3 wherein the non-transparent material covering the sidewalls of the transparent cover is a polymer material containing a non-transparent filler.

6. The module of any one of claims 1 - 3 wherein the non-transparent material covering the sidewalls of the transparent cover is an epoxy with carbon black.

7. The module of any one of claims 1 – 6 wherein the optical element is a lens element on a sensor-side of the module.

8. The module of any one of claims 1 – 6 including an optical element on the surface of the transparent cover, wherein the optical element is a lens element disposed on an object-side of the transparent cover.

9. The module of any one of claims 1 – 8 further including a baffle extending beyond a surface of the transparent cover, wherein the baffle is composed of the same non-transparent material that covers the sidewalls of the transparent cover.

10. The module of claim 1 including a dielectric band-pass filter on a surface of the transparent cover.

11. A method of fabricating optoelectronic modules each of which includes at least one optoelectronic device and at least one an optical element, the method comprising:

providing a transparent wafer having first and second surfaces on opposite sides of the transparent wafer, wherein there are a plurality of non-transparent spacer elements on one of the surfaces of the transparent wafer;

forming openings in the transparent wafer, each opening disposed over a respective one of the spacer elements and extending through the transparent wafer; and

substantially filling the openings in the transparent wafer with a material that is non-transparent to light emitted by or detectable by the optoelectronic device.

12. The method of claim 11 further including:

attaching a substrate wafer to the spacer elements such that the spacer elements separate the substrate wafer from the transparent wafer, wherein there are a plurality of optoelectronic devices mounted on the substrate wafer, and wherein the substrate wafer and the transparent wafer form a wafer stack; and

separating the wafer stack into a plurality of individual modules, wherein each module includes at least one of the optoelectronic devices substantially aligned with a corresponding optical element that is on a portion of the transparent wafer that has sidewalls covered by the non-transparent material.

13. The method of claim 11 further including:

attaching singulated optoelectronic devices to the spacer elements such that the spacer elements separate the singulated optoelectronic devices from the transparent wafer, wherein the singulated optoelectronic devices and the transparent wafer form a vertical stack; and

separating the vertical stack into a plurality of individual modules, wherein each module includes at least one of the singulated optoelectronic devices substantially aligned with a corresponding optical element that is on a portion of the transparent wafer that has sidewalls covered by the non-transparent material.

14. The method of any one of claims 11 - 13 wherein the optical elements are formed and the opening are filled using a single combined replication and vacuum injection tool.

15. The method of any one of claims 11 - 14 wherein the openings are formed by dicing, micromachining or laser cutting.

16. The method of any one of claims 11 – 15 wherein each of the openings extends partially into a respective one of the spacers elements.

17. The method of any one of claims 11 – 16 wherein the openings are filled with a non-transparent material using a vacuum injection tool.

18. The method of claim 17 further including causing the non-transparent material to harden.

19. The method of claim 11 further including forming optical elements on the opposite surface of the transparent wafer from the surface on which the spacer elements are disposed.

20. The method of claim 19 wherein the optical elements are formed by an embossing-type replication technique.

21. The method of claim 11 wherein providing a transparent wafer includes providing a transparent wafer having optical elements on at least one of the first or second surfaces.

22. The method of claim 11 wherein providing a transparent wafer includes providing a transparent wafer having optical elements on the same surface of the transparent wafer as the spacer elements.

23. The method of any one of claims 11 further including partially covering the first surface of the transparent wafer with the same non-transparent material that fills the openings in the transparent wafer, wherein the first surface is on the opposite side of the transparent wafer from the surface on which the spacer elements are disposed,

and wherein when the wafer stack is separated into individual modules, each module includes a baffle composed of the non-transparent material.

24. The method of claim 11 further including attaching a baffle wafer over the filled-in openings in the transparent wafer, the baffle wafer being composed of material that is non-transparent to light emitted by or detectable by the optoelectronic device.

25. The method of any one of claims 11 – 24 wherein the spacer elements are composed of the same non-transparent material as the material that fills the openings in the transparent wafer.

26. The method of claim 11 including forming optical elements on the opposite surface of the transparent wafer from the surface on which the spacer elements are disposed, wherein a single replication and vacuum injection tool is used to form the optical elements and to fill the openings in the transparent wafer with a non-transparent material.

27. The method of claim 11 wherein there is at least one of a focal length correction layer or an optical filter on a surface of the transparent wafer, the method further including:

attaching one or more optics assemblies over an object-side of the transparent wafer, wherein the one or more optics assemblies include lens stacks.

28. An optoelectronic module comprising:

an image sensor; and

a plurality of vertically stacked transparent substrates separated from one another by a spacer, wherein the stacked transparent substrates are attached to the image sensor, wherein each of the transparent substrates has an optical element on at least one of its surfaces,

wherein the spacer is composed of a material that is non-transparent to light detectable by the image sensor, and

wherein sidewalls of the transparent substrates are covered by a material that is non-transparent to light detectable by the image sensor.

29. The module of claim 28 wherein the non-transparent material covering the sidewalls of the transparent cover is a polymer material containing a non-transparent filler.

30. The module of claim 28 wherein the non-transparent material covering the sidewalls of the transparent cover is an epoxy with carbon black.

31. The module of any one of claims 28 - 30 further including a non-transparent baffle extending beyond a surface of the transparent substrates.

32. The module of claim 31 wherein the baffle is composed of the same non-transparent material that covers the sidewalls of the transparent substrates.

33. A method of fabricating optoelectronic modules each of which includes at least one optoelectronic device and at least one optical element, the method comprising:

providing a transparent wafer having first and second surfaces on opposite sides of the transparent wafer, wherein there are a plurality of non-transparent spacer elements on one of the surfaces of the transparent wafer;

forming openings in the transparent wafer, each opening disposed over a respective one of the spacer elements and extending through the transparent wafer; and

providing a material that is non-transparent to light emitted by or detectable by the optoelectronic devices in the openings of the transparent wafer so as to cover sidewalls of portions of the transparent wafer.

34. An optoelectronic module comprising:

an image sensor on a substrate, the image sensor defining a plurality of photosensitive regions each of which corresponds to a respective optical channel;

a transparent cover, in each optical channel, separated from the substrate by a spacer, wherein the spacer is composed of a material that is non-transparent to light detectable by the image sensor; and

a focal length correction layer on a surface of the transparent cover of at least one of the optical channels;

wherein sidewalls of the transparent cover are covered by a material that is non-transparent to light detectable by the photosensitive regions of the image sensor.

35. The optoelectronic module of claim 34 further including a respective optics assembly on an object-side of each transparent cover, wherein each optics assembly includes one or more lenses.

36. The optoelectronic module of claim 35 wherein each optics assembly includes a stack of injection molded lenses.

37. The optoelectronic module of claim 34 further including an optical filter on a surface of the transparent cover of each optical channel.

38. An optoelectronic module comprising:

a substrate;

a first optical channel;

a second optical channel;

a light sensitive device on the substrate and disposed in the first optical channel;

a first transparent cover over the light sensitive device and separated from the substrate by a spacer;

a band-pass filter on a surface of the first transparent cover;

a light emitting device on the substrate and disposed in the second optical channel; and

a second transparent cover over the light emitting device separated from the substrate by the spacer;

wherein the spacer is composed of a material that is non-transparent to light detectable by the light sensing device, and wherein side edges of the first and second transparent covers are covered by a material that is non-transparent to light detectable by the light sensing device..

39. The module of claim 38 wherein the light sensing device is operable to sense wavelengths of light emitted by the light emitting device and wherein the band-pass filter blocks light of wavelengths other than the wavelengths emitted by the light emitting device.

40. The module of claims 38 or 39 wherein the band-pass filter is a dielectric band-pass filter.

41. An optoelectronic module comprising an optical channel:

an image sensor on a substrate, the image sensor including a photosensitive region;

a transparent cover separated from the substrate by a spacer, wherein the spacer is composed of a material that is non-transparent to light detectable by the image sensor;

an optical filter disposed in the optical channel; and

an optics assembly on an object-side of the transparent cover, wherein the optics assembly includes one or more lenses.

wherein sidewalls of the transparent cover are covered by a material that is non-transparent to light detectable by the photosensitive regions of the image sensor.

42. The optoelectronic module of claim 41 wherein the optics assembly includes a stack of injection molded lenses.

43. The optoelectronic module of claim 41 wherein the optical filter is on a surface of the transparent cover.

44. The optoelectronic module of claim 41 wherein the optical filter comprises a dielectric band-pass filter.

45. The optoelectronic module of claim 41 wherein the optical filter is disposed on a surface of the photosensitive region of the image sensor.

46. The optoelectronic module of any one of claims 41 – 45 wherein the spacer is composed of the same material as the material that encapsulates the sidewalls of the transparent cover.

What is claimed is:

1. A method of fabricating optoelectronic modules each of which includes at least one optoelectronic device and at least one an optical element, the method comprising:

providing a transparent wafer having first and second surfaces on opposite sides of the transparent wafer, wherein there are a plurality of non-transparent spacer elements on one of the surfaces of the transparent wafer;

forming openings in the transparent wafer, each opening disposed over a respective one of the spacer elements and extending through the transparent wafer; and

substantially filling the openings in the transparent wafer with a material that is non-transparent to light emitted by or detectable by the optoelectronic device.

2. The method of claim 1 further including:

attaching a substrate wafer to the spacer elements such that the spacer elements separate the substrate wafer from the transparent wafer, wherein there are a plurality of optoelectronic devices mounted on the substrate wafer, and wherein the substrate wafer and the transparent wafer form a wafer stack; and

separating the wafer stack into a plurality of individual modules, wherein each module includes at least one of the optoelectronic devices substantially aligned with a corresponding optical element that is on a portion of the transparent wafer that has sidewalls covered by the non-transparent material.

3. The method of claim 1 further including:

attaching singulated optoelectronic devices to the spacer elements such that the spacer elements separate the singulated optoelectronic devices from the transparent wafer, wherein the singulated optoelectronic devices and the transparent wafer form a vertical stack; and

separating the vertical stack into a plurality of individual modules, wherein each module includes at least one of the singulated optoelectronic devices substantially aligned with a corresponding optical element that is on a portion of the transparent wafer that has sidewalls covered by the non-transparent material.

4. The method of claim 1 wherein the optical elements are formed and the opening are filled using a single combined replication and vacuum injection tool.

5. The method of claim 1 wherein the openings are formed by dicing, micromachining or laser cutting.

6. The method of claim 1 wherein each of the openings extends partially into a respective one of the spacers elements.

7. The method of claim 1 wherein providing a transparent wafer includes providing a transparent wafer having optical elements on at least one of the first or second surfaces.

8. The method of claim 1 wherein providing a transparent wafer includes providing a transparent wafer having optical elements on the same surface of the transparent wafer as the spacer elements.

9. The method of claim 1 further including partially covering the first surface of the transparent wafer with the same non-transparent material that fills the openings in the transparent wafer, wherein the first surface is on the opposite side of the transparent wafer from the surface on which the spacer elements are disposed,

and wherein when the wafer stack is separated into individual modules, each module includes a baffle composed of the non-transparent material.

10. The method of claim 1 further including attaching a baffle wafer over the filled-in openings in the transparent wafer, the baffle wafer being composed of material that is non-transparent to light emitted by or detectable by the optoelectronic device.

11. The method of claim 1 wherein the spacer elements are composed of the same non-transparent material as the material that fills the openings in the transparent wafer.

12. The method of claim 1 including forming optical elements on the opposite surface of the transparent wafer from the surface on which the spacer elements are disposed, wherein a single replication and vacuum injection tool is used to form the optical elements and to fill the openings in the transparent wafer with a non-transparent material.

13. The method of claim 1 wherein there is at least one of a focal length correction layer or an optical filter on a surface of the transparent wafer, the method further including:

attaching one or more optics assemblies over an object-side of the transparent wafer, wherein the one or more optics assemblies include lens stacks.

14. The method of claim 1 wherein the openings are filled with a non-transparent material using a vacuum injection tool.

15. The method of claim 14 further including causing the non-transparent material to harden.

16. The method of claim 1 further including forming optical elements on the opposite surface of the transparent wafer from the surface on which the spacer elements are disposed.

17. The method of claim 16 wherein the optical elements are formed by an embossing-type replication technique.

18. A method of fabricating optoelectronic modules each of which includes at least one optoelectronic device and at least one optical element, the method comprising:

providing a transparent wafer having first and second surfaces on opposite sides of the transparent wafer, wherein there are a plurality of non-transparent spacer elements on one of the surfaces of the transparent wafer;

forming openings in the transparent wafer, each opening disposed over a respective one of the spacer elements and extending through the transparent wafer; and

providing a material that is non-transparent to light emitted by or detectable by the optoelectronic devices in the openings of the transparent wafer so as to cover sidewalls of portions of the transparent wafer.