In yet other embodiments, the OLED structure **190** (or barrier region **120**), along withany chuck or other holder, is inserted into a vacuum chamber, whereupon a high-density material (such as those discussed above) or other appropriate material is applied, for example, by sputtering, by electron-beam techniques, or by any other known techniques for depositing a layer under vacuum.

Depending on the material used for the polymer substrate layers, chemical species can be released from the substrate layers. Hence, the substrates used in connection with the practice of the present invention are preferably degassed by heating under vacuum prior to their use. This is of enhanced importance for polymer substrate layers disposed adjacent the optoelectronic device (see, for example, FIG. **8** and FIG. **9**, in which the polymer substrate layer **110***a* is adjacent the OLED **140**).

Although the present invention has been described with respect to several exemplary embodiments, there are many other variations of the aboved described embodiments that will be apparent to those of ordinary skill in the art. It is understood that these variations are within the teachings of the present invention, and that the invention is to be limited only by the claims appended hereto.

What is claimed is:

1. An organic optoelectronic device structure comprising:

a first barrier region comprising a first composite layer stack and a second composite layer stack attached to said first composite layer stack, said first composite layer stack comprising a first polymer substrate layer, a first planarizing layer and a first high-density layer, and said second composite layer stack comprising a second polymer substrate layer, a second planarizing layer and a second high-density layer;

an additional barrier region; and

an organic optoelectronic device selected from an organic light emitting diode, an organic electrochromic display, an organic photovoltaic device and an organic thin film transistor disposed between said first barrier region and said additional barrier region, wherein said additional barrier region cooperates with said first barrier region to restrict transmission of water and oxygen to said optoelectronic device from an outer environment.

2. The organic optoelectronic device structure of claim **1**, wherein said first and second polymer substrate layers are of the same material composition.

3. The organic optoelectronic device structure of claim **1**, wherein said first and second polymer substrate layers are of different material compositions.

4. The organic optoelectronic device structure of claim **1**, wherein said first composite stack and said second composite stack are attached to one another via one of said first and second planarizing layers.

5. The organic optoelectronic device structure of claim **1**, further comprising an adhesive layer between said first and second composite stacks.

6. The organic optoelectronic device structure of claim **1**, wherein said first planarizing layer, said first high-density layer, said second planarizing layer and said second high-density layer are disposed between said first polymer substrate layer and said second polymer substrate layer.

7. The organic optoelectronic device structure of claim **1**, wherein (i) said first planarizing layer and said first high-density layer are disposed over said first polymer substrate layer, (ii) said second polymer substrate layer is disposed over said first planarizing layer and said first high-density layer, and (iii) said second planarizing layer and said second high-density layer are disposed over said second polymer substrate layer.

8. The organic optoelectronic device structure of claim **1**, wherein said first composite layer stack, said second composite layer stack or both said first and second composite layer stacks comprise two or more planarizing layers and two or more high-density layers.

9. The organic optoelectronic device structure of claim **1**, wherein said first composite layer stack, said second composite layer stack or both said first and second composite layer stacks comprise an alternating series of two or more planarizing layers and two or more high-density layers.

10. An OLED structure comprising:

a first barrier region comprising a first composite layer stack and a second composite layer stack attached to said first composite layer stack, said first composite layer stack comprising a first polymer substrate layer, a first planarizing layer and a first high-density layer, and said second composite layer stack comprising a second polymer substrate layer, a second planarizing layer and a second high-density layer;

an additional barrier region; and

an OLED disposed between said first barrier region and said additional barrier region, wherein said additional barrier region cooperates with said first barrier region to restrict transmission of water and oxygen from an outer environment to said optoelectronic device.

11. The OLED structure of claim **10**, wherein said first and second polymer substrate layers are of the same material composition.

12. The OLED structure of claim **10**, wherein said first and second polymer substrate layers are of different material compositions.

13. The OLED structure of claim **10**, wherein said first and second high-density layers are of the same material composition.

14. The OLED structure of claim **10**, wherein said first and second high-density layers are of different material compositions.

15. The OLED structure of claim **10**, wherein said first and second planarizing layers are of the same material composition.

16. The OLED structure of claim **10**, wherein said first and second planarizing layers are of different material compositions.

17. The OLED structure of claim **10**, wherein said first composite stack and said second composite stack are attached to one another via one of said first and second planarizing layers.

18. The OLED structure of claim **10**, further comprising an adhesive layer between said first and second composite stacks.

19. The OLED structure of claim **10**, wherein said first planarizing layer, said first high-density layer, said second planarizing layer and said second high-density layer are disposed between said first polymer substrate layer and said second polymer substrate layer.

20. The OLED structure of claim **10**, wherein (i) said first planarizing layer and said first high-density layer are disposed over said first polymer substrate layer, (ii) said second polymer substrate layer is disposed over said first planarizing layer and said first high-density layer, and (iii) said second planarizing layer and said second high-density layer are disposed over said second polymer substrate layer.

21. The OLED structure of claim **10**, wherein said first composite layer stack comprises two or more first planarizing layers and two or more first high-density layers.