CLAIMS

What is claimed is:

1. An article comprising:

a carrier comprising a carrier bonding surface;

a sheet comprising a sheet bonding surface; and

a surface modification layer disposed on at least one of the carrier bonding surface and the sheet bonding surface, wherein the surface modification layer comprises a plasma polymerized material, wherein the plasma polymerized material planarizes the at least one of the carrier bonding surface and the sheet bonding surface, and wherein the carrier bonding surface and the sheet bonding surface are bonded with the surface modification layer so that the carrier is temporarily bonded to the sheet.

2. An article comprising:

a carrier comprising a carrier bonding surface;

a sheet comprising a sheet bonding surface; and

at least one of a carrier surface modification layer disposed on the carrier bonding surface and a sheet surface modification layer disposed on the sheet bonding surface, wherein the at least one of the carrier surface modification layer and the sheet surface modification layer comprises a plasma polymerized material, wherein the plasma polymerized material planarizes the at least one of the carrier bonding surface and the sheet bonding surface, and wherein the carrier bonding surface and the sheet bonding surface are bonded with the at least one of the carrier surface modification layer and the sheet surface modification layer so that the carrier is temporarily bonded with the sheet.

3. The article of claim 1 or claim 2, wherein the surface modification layer has at least one of an elastic modulus and a plasticity configured to allow penetration of at least a portion of at least one of the carrier bonding surface and the sheet bonding surface into the surface modification layer.

4. The article of claim 3, wherein the elastic modulus is within a range of from about 0.6 GPa to about 20 GPa.

5. The article of any one of claims 1-4, wherein at least one of the carrier and the sheet comprises glass.

6. The article of any one of claims 1-5, wherein the carrier has a thickness within a range of from about 200 microns to about 3 mm.

7. The article of any one of claims 1-6, wherein the sheet has a thickness less than or equal to about 300 microns.

8. The article of any one of claims 1-7, wherein the surface modification layer has a thickness within a range from about 0.1 nm to about 100 nm.

9. The article of any one of claims 1-8, wherein the at least one of the planarized carrier bonding surface and the planarized sheet bonding surface has a surface roughness Rq less than about 0.8 nm.

10. The article of any one of claims 1-9, wherein the at least one of the carrier bonding surface and the sheet bonding surface has a surface roughness Rq within a range of about 0.8 nm to about 5.0 nm.

11. A method of making an article comprising:

depositing a surface modification layer on at least one of a carrier bonding surface of a carrier and a sheet bonding surface of a sheet, wherein the surface modification layer comprises a plasma polymerized material, and wherein the depositing of the plasma polymerized material planarizes the at least one of the carrier bonding surface and the sheet bonding surface; and

bonding the carrier bonding surface and the sheet bonding surface with the surface modification layer so that the carrier is temporarily bonded with the sheet.

12. The method of claim 11, wherein the at least one of the planarized carrier bonding surface and the planarized sheet bonding surface has a surface roughness Rq less than about 0.8 nm.

13. The method of claim 11 or claim 12, wherein the at least one of the carrier bonding surface and the sheet bonding surface has a surface roughness Rq within a range of about 0.8 nm to about 5.0 nm.

14. The method of any one of claims 11-13, wherein at least one of an elastic modulus and a plasticity of the surface modification layer allow penetration of at least a portion of at least one of the carrier bonding surface and the sheet bonding surface into the surface modification layer.