We claim:

1. A temporary bonding method comprising:

providing a stack comprising:

a first substrate having a back surface and a front surface;

a bonding layer adjacent said front surface and comprising a polyhydroxyether; and

a second substrate having a first surface adjacent said bonding layer, said bonding layer being the only layer between said first and second substrates; and

exposing said bonding layer to UV laser energy so as to facilitate separation of said first and second substrates.

2. The method of claim 1, wherein said polyhydroxyether comprises a copolymer of a diglycidyl ether and a dihydroxy dye.

3. The method of claim 2, wherein said diglycidyl ether is selected from the group consisting of bisphenol A diglycidyl ether, bisphenol F diglycidyl ether, 1,4-cyclohexanedimethanol diglycidyl ether, resorcinol diglycidyl ether, bisphenol A propoxylate diglycidyl ether, ethylene glycol diglycidyl ether, 1,4-cyclohexandimethanol diglycidyl ether, glycerol diglycidyl ether, 1,4-butanediol diglycidyl ether, neopentyl glycol diglycidyl ether, 1,3-butanediol diglycidyl ether, 1,3-bis(3-glycidoxypropyl)tetramethyldisiloxane, and combinations

thereof.

4. The method of claim 2, wherein said dihydroxy dye is selected from the group consisting of 4,4'-dihydroxybenzophenone, dihydroxy chalcone dyes, 4-[(2-phenylhydrazono)methyl]resorcinol, dihydroxyazobenzene, dihydroxyanthraquinone, 2,2'-methylenebis[6-(benzotriazol-2-yl)-4-*tert*-octylphenol], curcumin, curcumin derivatives, and combinations thereof.

5. The method of claim 1, wherein said bonding layer is a thermoplastic layer.

6. The method of claim 1, wherein said exposing is carried out at a dosage of from about 200 $mJ/cm^2$ to about 400 $mJ/cm^2$.

7. The method of claim 1, wherein said providing a stack comprises forming said bonding layer on said front surface.

8. The method of claim 7, wherein said forming comprises applying a flowable bonding composition to said front surface, said flowable composition comprising a polyhydroxyether dispersed or dissolved in a solvent system.

9. The method of claim 8, further comprising heating said composition at a temperature of from about 120ºC to about 250ºC for a time period of from about 60 seconds to about 10 minutes to form said bonding layer.

10. The method of claim 7, wherein said forming comprises applying a free-standing film comprising polyhydroxyether to said front surface to form said bonding layer.

11. The method of claim 10, wherein said applying comprises adhering said free-standing film to said front surface.

12. The method of claim 1, wherein one of said front surface and said first surface is selected from the group consisting of:

(1) a device surface comprising an array of devices selected from the group consisting of integrated circuits; MEMS; microsensors; power semiconductors; light-emitting diodes; photonic circuits; interposers; embedded passive devices; and microdevices fabricated on or from silicon, silicon-germanium, gallium arsenide, and gallium nitride; and

(2) a device surface comprising at least one structure selected from the group consisting of: solder bumps; metal posts; metal pillars; and structures formed from a material selected from the group consisting of silicon, polysilicon, silicon dioxide, silicon (oxy)nitride, metal, low k dielectrics, polymer dielectrics, metal nitrides, and metal silicides.

13. The method of claim 1, wherein one of said first and second substrates comprises glass or other transparent material.

14. The method of claim 1, further comprising subjecting said stack to processing selected from the group consisting of back-grinding, chemical-mechanical polishing, etching,

metallizing, dielectric deposition, patterning, passivation, annealing, redistribution layer formation, and combinations thereof, prior to separating said first and second substrates.

~~15. The method of claim 1, wherein said bonding layer is the only layer between said first and second substrates.~~

~~16. The method of claim 1, wherein said bonding layer has a first adhesion strength and said stack further comprising a second bonding layer between said first and second substrates, said second bonding layer having an adhesion strength that is greater than said first adhesion strength.~~

~~17. A microelectronic structure comprising:~~

~~a first substrate having a back surface and a front surface;~~

~~a bonding layer adjacent said front surface, said bonding layer comprising a polyhydroxyether; and~~

~~a second substrate having a first surface adjacent said bonding layer, at least one of said front surface and said first surface being a device surface.~~

~~18. The microelectronic structure of claim 17, wherein said polyhydroxyether comprises a copolymer of a diglycidyl ether and a dihydroxy dye.~~

~~19. The microelectronic structure claim 18, wherein said diglycidyl ether is selected from the group consisting of bisphenol A diglycidyl ether, bisphenol F diglycidyl ether, 1,4-cyclohexanedimethanol diglycidyl ether, resorcinol diglycidyl ether, bisphenol A propoxylate diglycidyl ether, ethylene glycol diglycidyl ether, 1,4-cyclohexandimethanol diglycidyl ether,~~

~~glycerol diglycidyl ether, 1,4-butanediol diglycidyl ether, neopentyl glycol diglycidyl ether, 1,3-butanediol diglycidyl ether, 1,3-bis(3-glycidoxypropyl)tetramethyldisiloxane, and combinations thereof.~~

~~20. The microelectronic structure of claim 18, wherein said dihydroxy dye is selected from the group consisting of 4,4'-dihydroxybenzophenone, dihydroxy chalcone dyes, 4-[(2-phenylhydrazono)methyl]resorcinol, dihydroxyazobenzene, dihydroxyanthraquinone, 2,2'-methylenebis[6-(benzotriazol-2-yl)-4-*tert*-octylphenol], curcumin, curcumin derivatives, and combinations thereof.~~

~~21. The microelectronic structure of claim 17, wherein said bonding layer is a thermoplastic layer.~~

~~22. The microelectronic structure of claim 17, said bonding layer having an average thickness of from about 1 μm to about 100 μm.~~

~~23. The microelectronic structure of claim 17, wherein one of said front surface and said first surface is selected from the group consisting of:~~

~~(1) a device surface comprising an array of devices selected from the group consisting of integrated circuits; MEMS; microsensors; power semiconductors; light-emitting diodes; photonic circuits; interposers; embedded passive devices; and microdevices fabricated on or from silicon, silicon-germanium, gallium arsenide, and gallium nitride; and~~

~~(2) a device surface comprising at least one structure selected from the group~~

~~consisting of: solder bumps; metal posts; metal pillars; and structures formed from a material selected from the group consisting of silicon, polysilicon, silicon dioxide, silicon (oxy)nitride, metal, low k dielectrics, polymer dielectrics, metal nitrides, and metal silicides.~~

~~24. The microelectronic structure of claim 17, wherein one of said first and second substrates comprises glass or other transparent material.~~

~~25. The microelectronic structure of claim 17, wherein said bonding layer is the only layer between said first and second substrates.~~

~~26. The microelectronic structure of claim 17, wherein said bonding layer has a first adhesion strength and further comprising a second bonding layer between said first and second substrates, said second bonding layer having an adhesion strength that is greater than said first adhesion strength.~~

15.~~27.~~ A method of forming a microelectronic structure, said method comprising:

(I) forming a build-up layer on the surface of a substrate, said build-up layer comprising a polyhydroxyether and having an upper surface that is remote from the surface of said substrate;

(II) forming a first redistribution layer on said upper surface; and

(III) optionally forming one or more additional redistribution layers on said first redistribution layer.

16.~~28.~~ The method of claim 15~~27~~, further comprising:

(IV) attaching a solder ball to the last redistribution layer of forming (II) and optional forming (III);

(V) attaching a die to said solder ball; and

(VI) optionally repeating attaching (IV) and attaching (V) one or more times.

17.~~29.~~ The method of claim 16~~28~~, further comprising forming an epoxy layer over said die and solder ball to form a fan-out wafer level package structure on said substrate.

18.~~30.~~ The method of claim 17~~29~~, further comprising separating said substrate and said fan-out wafer level package structure.

19.~~31.~~ The method of claim 18~~30~~, wherein said separating comprises exposing said build-up layer to laser energy so as to facilitate separation of said substrate and said fan-out wafer level package structure.

20.~~32.~~ The method of claim 19~~31~~, wherein said exposing is carried out at a dosage of from about 200 mJ/cm$^2$ to about 400 mJ/cm$^2$.

21.~~33.~~ The method of claim 15~~27~~, wherein said polyhydroxyether comprises a copolymer of a diglycidyl ether and a dihydroxy dye.

22.~~34.~~ The method of claim 21~~33~~, wherein said diglycidyl ether is selected from the group consisting of bisphenol A diglycidyl ether, bisphenol F diglycidyl ether, 1,4-

cyclohexanedimethanol diglycidyl ether, resorcinol diglycidyl ether, bisphenol A propoxylate diglycidyl ether, ethylene glycol diglycidyl ether, 1,4-cyclohexandimethanol diglycidyl ether, glycerol diglycidyl ether, 1,4-butanediol diglycidyl ether, neopentyl glycol diglycidyl ether, 1,3-butanediol diglycidyl ether, 1,3-bis(3-glycidoxypropyl)tetramethyldisiloxane, and combinations thereof.

23.~~35.~~ The method of claim 21~~33~~, wherein said dihydroxy dye is selected from the group consisting of 4,4'-dihydroxybenzophenone, dihydroxy chalcone dyes, 4-[(2-phenylhydrazono)methyl]resorcinol, dihydroxyazobenzene, dihydroxyanthraquinone, 2,2'-methylenebis[6-(benzotriazol-2-yl)-4-*tert*-octylphenol], curcumin, curcumin derivatives, and combinations thereof.

24.~~36.~~ The method of claim 15~~27~~, wherein said forming (I) comprises applying a flowable composition to the surface of said substrate, said flowable composition comprising said polyhydroxyether dispersed or dissolved in a solvent system.

25.~~37.~~ The method of claim 24~~36~~, further comprising heating said composition at a temperature of from about 120ºC to about 250ºC for a time period of from about 60 seconds to about 10 minutes to form said build-up layer.

26.~~38.~~ The method of claim 15~~27~~, wherein said forming (I) comprises applying a free-standing film comprising said polyhydroxyether to the surface of said substrate to form said build-up layer.

27.~~39.~~ The method of claim 26~~38~~, wherein said applying comprises adhering said free-standing film to the surface of said substrate.

28.~~40.~~ The method of claim 15~~27~~, wherein said substrate comprises glass or other transparent material.

29.~~41.~~ The method of claim 15~~27~~, further comprising:

attaching multiple solder balls to the last redistribution layer of forming (II) and optional forming (III); and

attaching a die to at least two of said multiple solder balls.

~~42. A microelectronic structure comprising:~~

~~a substrate having a surface;~~

~~a build-up layer on the substrate surface, said build-up layer comprising a polyhydroxyether and having an upper surface that is remote from said substrate surface; and~~

~~a first redistribution layer on said upper surface.~~

~~43. The structure of claim 42, further comprising one or more additional redistribution layers on said first redistribution layer.~~

~~44. The structure of claim 42, further comprising at least one solder ball on said first redistribution layer and a die attached to said at least one solder ball.~~

~~45. The structure of claim 44, further comprising an epoxy coating over said solder ball and die.~~

~~46. The structure of claim 42, wherein said polyhydroxyether comprises a copolymer of a diglycidyl ether and a dihydroxy dye.~~

~~47. The structure of claim 46, wherein said diglycidyl ether is selected from the group consisting of bisphenol A diglycidyl ether, bisphenol F diglycidyl ether, 1,4-cyclohexanedimethanol diglycidyl ether, resorcinol diglycidyl ether, bisphenol A propoxylate diglycidyl ether, ethylene glycol diglycidyl ether, 1,4-cyclohexandimethanol diglycidyl ether, glycerol diglycidyl ether, 1,4-butanediol diglycidyl ether, neopentyl glycol diglycidyl ether, 1,3-butanediol diglycidyl ether, 1,3-bis(3-glycidoxypropyl)tetramethyldisiloxane, and combinations thereof.~~

~~48. The structure of claim 46, wherein said dihydroxy dye is selected from the group consisting of 4,4'-dihydroxybenzophenone, dihydroxy chalcone dyes, 4-[(2-phenylhydrazono)methyl]resorcinol, dihydroxyazobenzene, dihydroxyanthraquinone, 2,2'-methylenebis[6-(benzotriazol-2-yl)-4-*tert*-octylphenol], curcumin, curcumin derivatives, and combinations thereof.~~

~~49. The structure of claim 42, wherein one of said first and second substrates comprises glass or other transparent material.~~

30. The method of claim 1, wherein said exposing comprises exposing said bonding

layer to energy having a wavelength of from about 200 nm to about 400 nm.

31. The method of claim 1, wherein said bonding layer consists essentially of said polyhydroxyether.