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;

a second substrate having a first surface; and

a release layer between said first surface and said bonding layer, said release layer comprising a polyketanil; and

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

2. The method of claim 1, wherein said polyketanil is crosslinked.

3. The method of claim 1, wherein said polyketanil is a polymer of a monomer comprising an amine functional group, a ketone functional group, and an aromatic moiety, wherein said amine functional group and said ketone functional group are bonded to said aromatic moiety.

4. The method of claim 3, wherein said recurring monomer is 4-aminoacetophenone.

5. The method of claim 1, further comprising one or both of the following:

said front surface is a device surface that comprises 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, gallium nitride, and combinations of the foregoing; or

said first surface is a device surface that comprises 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, gallium nitride, and combinations of the foregoing.

6. The method of claim 1, wherein one or both of said first substrate or said second substrate comprises glass or other transparent material.

7. The method of claim 1, further comprising one or both of the following:

said front surface is 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, metal silicides, and combinations of the foregoing; or

said first surface is 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, metal silicides, and combinations of the foregoing.

8. 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, and combinations thereof, prior to separating said first and second substrates.

9. The method of claim 1, wherein said providing comprises bonding said first and second substrate together to form said stack.

10. A microelectronic structure comprising:

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

a bonding layer adjacent said front surface;

a second substrate having a first surface; and

a release layer between said first surface and said bonding layer, said release layer comprising a polyketanil.

11. The structure of claim 10, wherein said polyketanil is crosslinked.

12. The structure of claim 10, wherein said polyketanil is a polymer of a monomer comprising an amine functional group, a ketone functional group, and an aromatic moiety, wherein said amine functional group and said ketone functional group are bonded to said aromatic moiety.

13. The structure of claim 12, wherein said recurring monomer is 4-aminoacetophenone.

14. The structure of claim 10, further comprising one or both of the following:

said front surface is a device surface that comprises 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, gallium nitride, and combinations of the foregoing; or

said first surface is a device surface that comprises 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, gallium nitride, and combinations of the foregoing.

15. The structure of claim 10, wherein one or both of said first substrate or said second substrate comprises glass or other transparent material.

16. The structure of claim 10, further comprising one or both of the following:

said front surface is 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, metal silicides, and combinations of the foregoing; or

said first surface is 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, metal silicides, and combinations of the foregoing.

17. A method of forming a release layer comprising:

applying a composition to a substrate surface comprising glass or other transparent material, said composition comprising a polyketanil dissolved or dispersed in a solvent system; and

heating said composition at a temperature of from about 60°C to about 350°C to form the release layer.

18. The method of claim 17, wherein said composition comprises a plurality of polyketanil chains, and said heating causes a first polyketanil chain having an initial molecular weight (A) to undergo a chain-extending reaction with a second polyketanil chain having an initial molecular weight (B) to form a polymer having a molecular weight that is greater than the initial molecular weight (A) of the first polyketanil and greater than the initial molecular weight (B) of the second polyketanil.

19. The method of claim 18, wherein said heating causes a plurality of said chain-extending reactions among said plurality of polyketanil chains.

20. The method of claim 17, wherein said polyketanil is a polymer of a monomer comprising an amine functional group, a ketone functional group, and an aromatic moiety, wherein said amine functional group and said ketone functional group are bonded to said aromatic moiety.

21. A method of forming a microelectronic structure, said method comprising:

(I) forming a releasable build-up layer on the surface of a substrate, said releasable build-up layer comprising a polyketanil 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.

22. The method of claim 21, further comprising exposing said releasable build-up layer to laser energy and separating said substrate and a fan-out wafer level package structure.

23. The method of claim 21, wherein said polyketanil is a polymer of a monomer comprising an amine functional group, a ketone functional group, and an aromatic moiety, wherein said amine functional group and said ketone functional group are bonded to said aromatic moiety.

24. A microelectronic structure comprising:

a substrate having a surface;

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

a first redistribution layer on said upper surface.

25. The structure of claim 24, wherein said substrate comprises glass or other transparent material.

26. The structure of claim 24, wherein said polyketanil is crosslinked.

27. The structure of claim 24, wherein said polyketanil is a polymer of a monomer comprising an amine functional group, a ketone functional group, and an aromatic moiety, wherein said amine functional group and said ketone functional group are bonded to said aromatic moiety.

28. The structure of claim 27, wherein said recurring monomer is 4-aminoacetophenone.