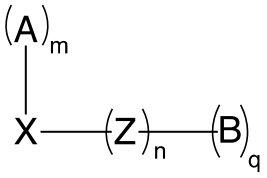
Claims

1. A resin having a structure defined by Formula (VI):



(VI),

wherein

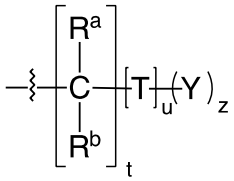
X is cyclopentadiene;

B is H;

$(Z)_n$ is a bond;

m is an integer ranging from 1 to 5;

and A has the structure defined by Formula (IIC):



(IIC),

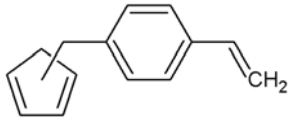
wherein R^a and R^b are independently selected from H, F, a C_1 to C_{10} linear or cyclic, branched or straight chain aliphatic group; T is $–CH_2–$, –phenyl, or $–CH_2–$phenyl; Y is H, $–CH_3$, $–CH=CH_2$, $–CH=CH-CH_3$, or alkyne; t is 0 or an integer ranging from 1 to 20; u is 0 or 1; z is an integer ranging from 1 to 5.

2. The resin of claim 1, wherein t is 1; and R^a and R^b are each H.

3. The resin of claim 2, wherein Y is $–CH=CH_2$.

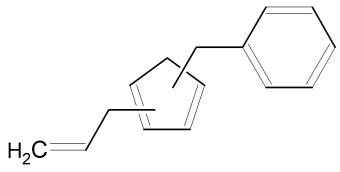
4. The resin of claim 1, wherein m is 2, and a first A group comprises a vinyl benzyl moiety; and wherein a second A group is $–CH_2–CH=CH_2$.

5. The resin of claim 1, wherein the resin has the structure



.

6. The resin of claim 1, wherein the resin has the structure



.

7. The resin of claim 1, wherein the resin comprises at least one A moiety terminating in one of a –CH=CH2 group, a –CH=CH-CH3 group, or an alkyne group.

8. A polymer or copolymer derived from the resin of claim 1.

9. The polymer or copolymer of claim 8, wherein the polymer or copolymer has a room temperature viscosity of 100 to 1,000,000 mPa*s.

10. The polymer or copolymer of claim 8, wherein the polymer or copolymer comprises a glassy material which can be ground into a fine powder.

11. The polymer or copolymer of claim 8, wherein the polymer or copolymer is soluble in an organic solvent selected from the group consist of MEK, Xylenes, NMP, DMF, DCM, Acetonitrile, Acetone, DMSO, THF.

12. The polymer or copolymer of claim 8, wherein the polymer or copolymer comprises a molecular weight ranging from between about 200 to about 1,000,000 Da.

13. The polymer or copolymer of claim 8, further comprising an additive selected from the group consisting of adhesion agents, peroxides, crosslinking agents, antioxidants, flame retardants, diluents and fillers.

14. The polymer or copolymer of claim 8, wherein the polymer or copolymer has a Dk value ranging from about 1.5 to about 3.

15. The polymer or copolymer of claim 8, wherein the polymer or copolymer polymer has a Df value ranging from about 0.0001 to 0.004.

16. A polymer or copolymer comprising (i) a resin of claim 1; and (ii) a second component selected from the group consisting of polyethylenes, polypropylenes, polybutylenes, low vinyl polybutadienes (predominantly 1,3 addition), high vinyl polybutadienes (significant 1,2 addition), polystyrenes, butadiene-styrene copolymers, SMA polymers, ABS polymers, polydicyclopentadienes, epoxies, polyurethanes, cyanate esters, poly(phenylene oxide), EPDM polymers, cyclic olefin copolymers (COC), polyimides, bismaleimides, phosphazenes, olefin-modified phosphazenes, acrylates, vinyl esters, polylactones, polycarbonates, polysulfones, polythioethers, polyetheretherketones (PEEK), polydimethylsiloxanes (PDMS), polyethylene terephthalates (PET), and polybutylene terephthalates (PBT), styrene, divinylbenzene, 1,2-bis(vinylphenyl)ethane, vinylbenzyl ether compounds, vinyl ether compounds, allyl ether compounds, vinylphenyl monomers, vinyl monomers, and allyl monomers.

17. A copolymer derived from a polymerization of the resin of claim 1, and a comonomer, wherein the comonomer is selected from the group consisting of styrene, divinyl benzene, vinyl toluene, methyl styrene, tert-butyl styrene, alpha-methyl styrene, alpha-methyl styrene dimer, vinyl cyclohexene, ethylidene norbornene, vinyl norbornene, alpha-pinene, beta-pinene, limonene, other terpenes, polybutadienes, modified polybutadienes, polystyrenes (homopolymer and block-copolymers), modified polystyrenes, polyterpenes, other vinyl-reactive monomers, and reactive dimers/oligomers/polymers/co-polymers thereof.

18. A composition comprising a first resin of claim 1 and a second resin of claim 1, wherein the first and second resins are different.

19. A flexible printed circuit board comprising a material derived from the resin of claim 1.

20. A radome or satellite structure comprising a material derived from the resin of claim 1.

21. A resin of claim 8 for use in any one of: (i) a Copper clad laminate (CCL), (ii) a HDI substrate, (iii) an IC substrate in printed circuit boards at high temperature and low Df applications; (iv) a molding compound in power device application; and (v) RF heating in oil and gas applications.