

CLAIMS

What is claimed is:

1. A flexible block copolymer for use in an epoxy component of a two-part, epoxy-amine system, the flexible block copolymer comprising:
 - a hydrophobic polyol block;
 - functional endcaps provided by epoxy groups, acetoacetate groups, or both, the endcaps having a functionality greater than 1;
 - optional isocyanate-functional extension groups; and
 - when the hydrophobic polyol block includes epoxy or fatty acid derived polyol groups, then the flexible copolymer further includes one or more cyclic ester-derived blocks between the hydrophobic polyol block and the functional endcaps, wherein each cyclic ester-derived block includes the residue of at least 3 or more repeating cyclic ester groups.
2. The flexible polymer according to claim 1, wherein the hydrophobic polyol block includes a C20 to a C60 dimer or trimer fatty acid diol and wherein the one or more cyclic ester-derived blocks includes the residue of at least 3 or more repeating lactone groups.
3. The flexible polymer according to claims 1 or 2, where the hydrophobic polyol block includes a polyalkyleneglycol diol having a number average molecular weight of about 500 to about 2000 g/mol.
4. The flexible polymer according to claim 3, wherein the polyalkylene glycol diol is a polyethylene glycol diol or a polypropylene glycol diol.
5. The flexible polymer according to any of claims 1 to 4, wherein the hydrophobic polyol block is derived from a diester of a diglycidyl ether.
6. The flexible polymer according to any of claims 1 to 5, wherein the hydrophobic polyol block is derived from glycidyl ethers of (cyclo)aliphatic or aromatic hydroxy compounds or derived from glycidyl ethers based on polyhydric alcohols or phenols.

7. The flexible polymer according any of claims 1 to 6, wherein the hydrophobic polyol block is derived from a diester of a diglycidyl ester.

8. The flexible polymer according to any of claims 1 to 7, wherein the hydrophobic polyol block is derived from polyglycidyl esters of polycarboxylic acids.

9. The flexible polymer according to any of claims 1 to 8, further comprising the isocyanate-functional extension groups selected from 2,2,4-trimethylhexamethylene diisocyanate, isophorone diisocyanate, 1,6-hexane diisocyanate, methylene bis (4-cyclohexylisocyanate), and combinations thereof.

10. The flexible polymer according to any of claims 1 to 9, wherein the functional endcaps includes acetoacetate groups.

11. The flexible polymer according to claim 10, wherein the acetoacetate groups are derived from C1 to C6 acetoacetate.

12. A flexible block copolymer for use in an epoxy component of a two-part, epoxy-amine system, the flexible block copolymer comprising the reaction product of (i) a hydrophobic polyol selected from a C20 to C60 dimer or trimer fatty acid, diesters of a diglycidyl ether, diesters of a diglycidyl ester, and combinations thereof; (ii) optional isocyanate-functional extension groups, and (iii) one or more C4 to C9 cyclic esters; the reaction product is functionally end capped with epoxy groups, acetoacetate groups, or both, the endcaps having a functionality greater than 1; and wherein the one or more C4 to C9 cyclic esters form a cyclic ester-derived block of the flexible block copolymer including at least 3 or more repeating cyclic ester-derived groups.

13. The flexible block copolymer according to claim 12, wherein the hydrophobic polyol is the C20 to a C60 dimer or trimer fatty acid and wherein the cyclic ester-derived block includes the residue of at least 3 or more repeating caprolactone-derived groups.

14. The flexible block copolymer according to claim 12 or 13, wherein the hydrophobic polyol is derived from a diester of a diglycidyl ether.
15. The flexible block copolymer according to any of claims 12 to 14, wherein the hydrophobic polyol block is derived from glycidyl ethers of (cyclo)aliphatic or aromatic hydroxy compounds or derived from glycidyl ethers based on polyhydric alcohols or phenols.
16. The flexible block copolymer according to any of claims 12 to 15, wherein the hydrophobic polyol is derived from a diester of a diglycidyl ester.
17. The flexible polymer according to any of claims 12 to 16, wherein the hydrophobic polyol block is derived from polyglycidyl esters of polycarboxylic acids.
18. The flexible block copolymer according to any of claims 12 to 17, further comprising the isocyanate-functional extension groups selected from 2,2,4-trimethylhexamethylene diisocyanate, isophorone diisocyanate, 1,6-hexane diisocyanate, methylene bis (4-cyclohexylisocyanate), and combinations thereof.
19. The flexible block copolymer according to any of claims 12 to 18, wherein the functional endcaps includes the acetoacetate groups derived from C1 to C6 acetoacetate.
20. A coating composition including the flexible block copolymer of any of claims 1 to 19.