WHAT IS CLAIMED IS:

1. A method of coupling oligonucleotides to a polymer, the method comprising:

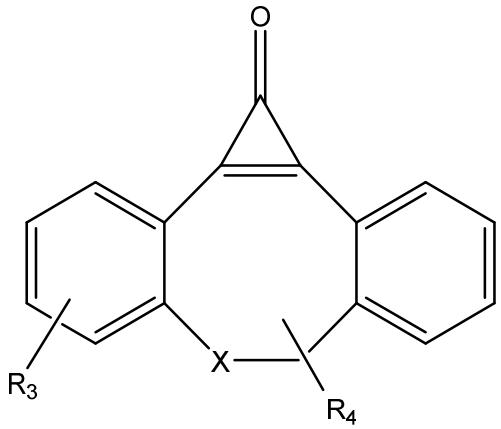
selectively irradiating inactive moieties in a first region of a polymer with light, while not irradiating inactive moieties in a second region of the polymer, to generate first active moieties in the first region of the polymer;

coupling the first active moieties to first oligonucleotides;

irradiating the inactive moieties in the second region of the polymer with light to generate second active moieties in the second region of the polymer; and

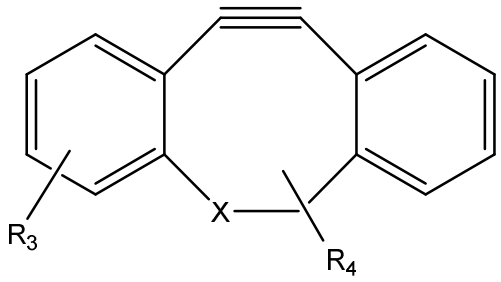
coupling the second active moieties to second oligonucleotides.

2. The method of claim 1, wherein the inactive moieties in the first region of the polymer or in the second region of the polymer comprise a cyclopropenone-masked dibenzocyclooctyne having the structure:

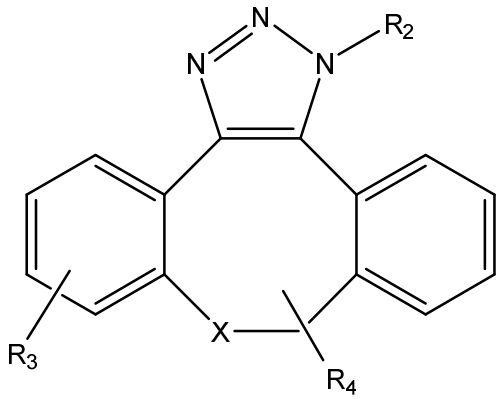


wherein one of R_3 and R_4 is R_1 and the other is H; wherein R_1 is a linkage to a backbone of the polymer; and wherein X is CH_2, O, S, or NH if R_4 is not directly coupled to X, or wherein X is CH or N if R_4 is directly coupled to X.

3. The method of claim 2, wherein the first active moieties or the second active moieties comprise a dibenzocyclooctyne:

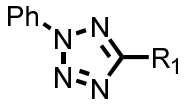


4. The method of claim 3, wherein the first oligonucleotides or second oligonucleotides are coupled to azides (N_3) that react with the dibenzocyclooctyne to form a cycloadduct having the structure:



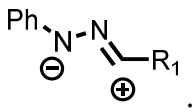
where R_2 represents the first oligonucleotides or the second oligonucleotides.

5. The method of claim 1, wherein the inactive moieties in the first region of the polymer or in the second region of the polymer comprise a tetrazole having the structure:

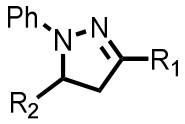


where R_1 represents a linkage to a backbone of the polymer.

6. The method of claim 5, wherein the first active moieties or the second active moieties comprise nitrile imines having the structure:

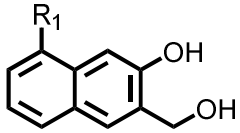


7. The method of claim 6, wherein the first oligonucleotides or second oligonucleotides are coupled to olefins that react with the first active moieties or the second active moieties to form a pyrazoline having the structure:



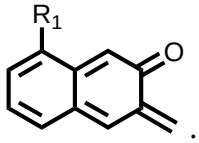
where R_2 represents the first oligonucleotides or the second oligonucleotides.

8. The method of claim 1, wherein the inactive moieties in the first region of the polymer or in the second region of the polymer comprise a 3-(hydroxymethyl)-2-naphthol having the structure:



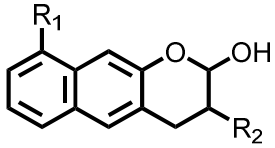
where R_1 represents a linkage to a backbone of the polymer.

9. The method of claim 8, wherein the first active moieties or the second active moieties comprise a compound having the structure:



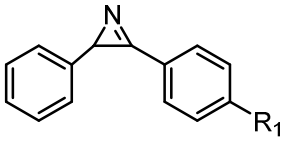
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10. The method of claim 9, wherein the first oligonucleotides or second oligonucleotides are coupled to vinyl ethers that react with the first active moieties or the second active moieties to form a benzochroman having the structure:



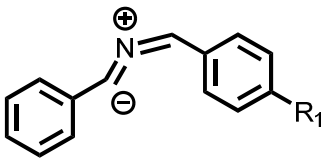
where R_2 represents the first oligonucleotides or the second oligonucleotides.

11. The method of claim 1, wherein the inactive moieties in the first region of the polymer or in the second region of the polymer comprise a 2H-azirine having the structure:



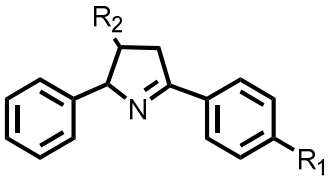
where R_1 represents a linkage to a backbone of the polymer.

12. The method of claim 11, wherein the first active moieties or the second active moieties comprise a nitrile ylide having the structure:



.

13. The method of claim 12, wherein the first oligonucleotides or second oligonucleotides are coupled to olefins that react with the first active moieties or the second active moieties to form a pyrroline having the structure:



where R_2 represents the first oligonucleotides or the second oligonucleotides.

14. The method of any one of claims 1 to 13, wherein the first oligonucleotides comprise a mixture of first primers lacking an excision moiety and second primers comprising an excision moiety.

15. The method of claim 14, wherein the second oligonucleotides comprise a mixture of third primers comprising an excision moiety and fourth primers lacking an excision moiety.

16. The method of claim 15, wherein the first and third primers have the same sequence as one another except for the excision moiety, and wherein the second and fourth primers have the same sequence as one another except for the excision moiety.

17. The method of claim 15 or claim 16, wherein the sequences of the first and second primers are orthogonal to one another, and wherein the sequences of the third and fourth primers are orthogonal to one another.

18. The method of any one of claims 1 to 17, wherein the first region of the polymer comprises a plurality of first subregions, and wherein the second region of the polymer comprises a plurality of second subregions.

19. The method of claim 18, wherein each of the first subregions is contiguous with a corresponding one of the second subregions.

20. The method of claim 19, wherein each of the first subregions, and the corresponding one of the second subregions within which that first subregion is continuous, is located within a well.

21. The method of any one of claims 1 to 20, further comprising:

depositing photoresist over the first and second regions;

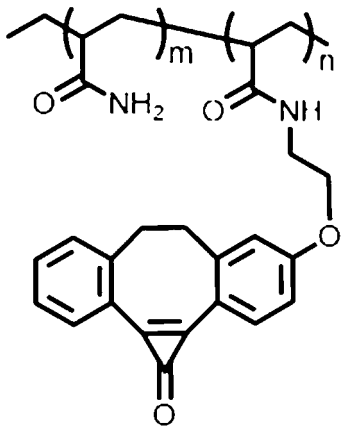
while selectively irradiating the inactive moieties in the first region of the polymer with light and while not irradiating the inactive moieties in the second region of the polymer, irradiating the photoresist over the first region with light;

before coupling the first active moieties to the first oligonucleotides, removing the irradiated photoresist from the first region of the polymer; and

before coupling the second active moieties to the second oligonucleotides, removing the photoresist from the second region of the polymer.

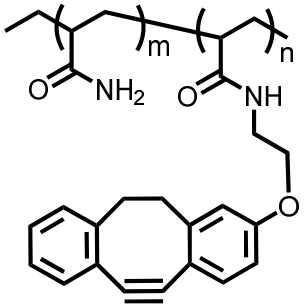
22. The method of claim 21, wherein the irradiated photoresist is removed from the first region of the polymer and the photoresist is removed from the second region of the polymer in a common step as one another.

23. A polymer, comprising a poly(cyclopropenone-masked dibenzocyclooctyne-acrylamide-co-acrylamide) copolymer having the structure:



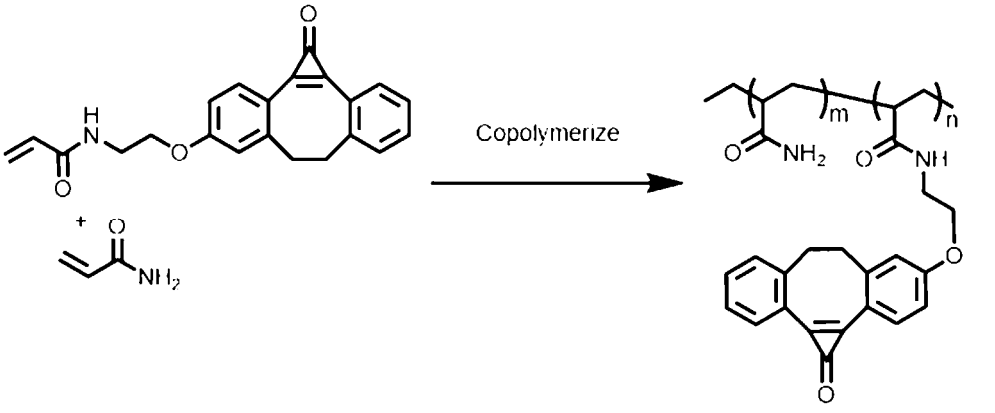
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24. A polymer, comprising a poly(dibenzocyclooctyne-acrylamide-co-acrylamide) copolymer having the structure:



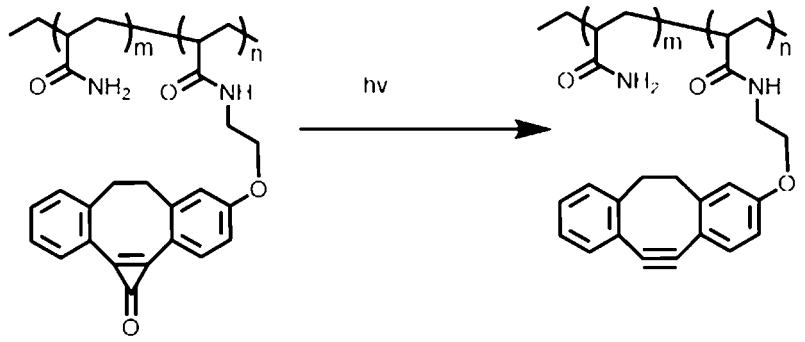
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25. A method of making a polymer, the method comprising the radical-induced polymerization reaction:



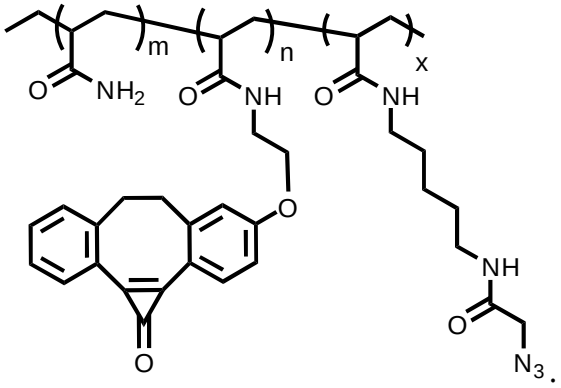
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26. A method of making a polymer, the method comprising the light-induced reaction:



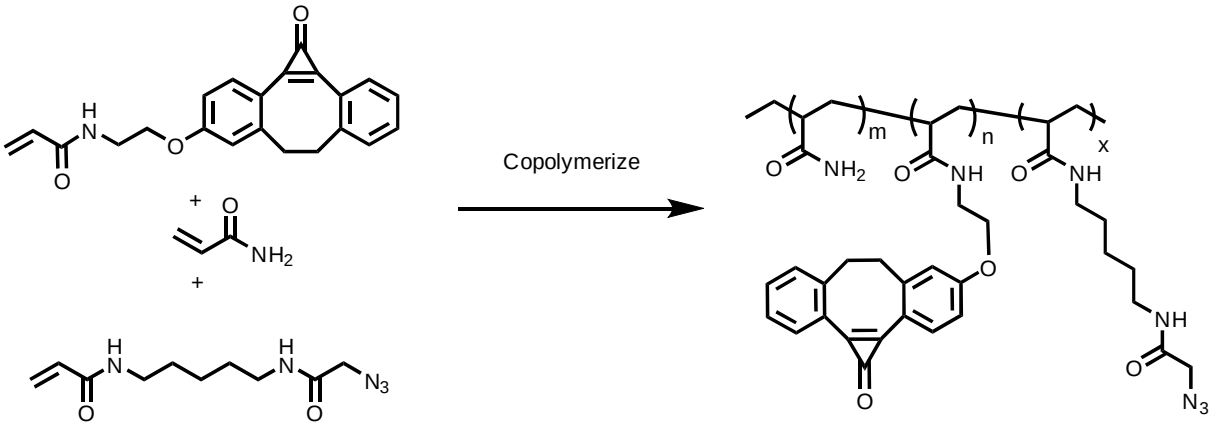
.

27. A polymer, comprising the structure:



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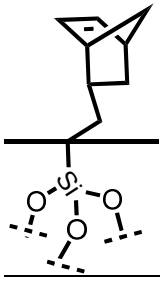
28. A method of making a polymer, the method comprising the radical-induced polymerization reaction:



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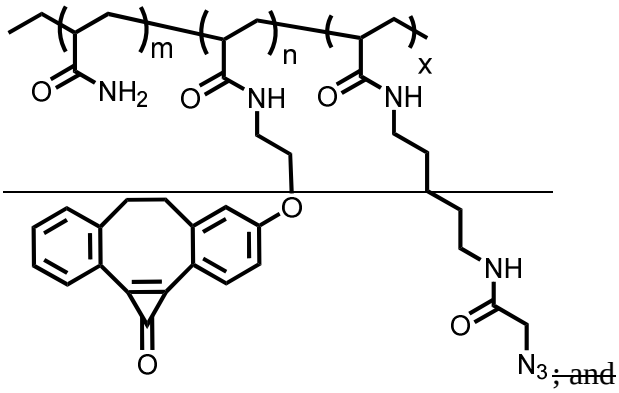
29. A method of functionalizing a substrate, the method comprising:

providing a substrate comprising norbornene groups:



where the dotted lines represent the surface of the substrate;

depositing onto the substrate a polymer comprising the structure:

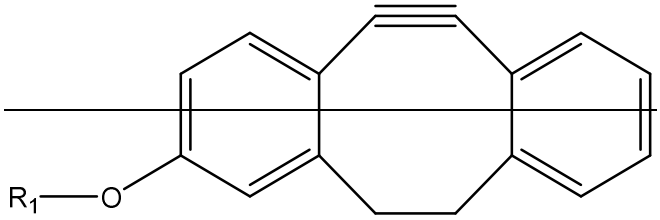


; and

reacting the azide (N_3) groups of the polymer with the norbornene groups to couple the polymer to the substrate.

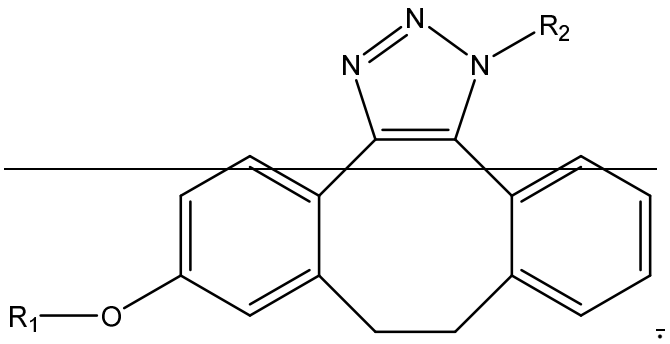
30. The method of claim 29, further comprising making the polymer using the method of claim 28.

31. The method of claim 29 or claim 30, further comprising using light to convert the cyclopropenone-masked dibenzocyclooctyne to dibenzocyclooctyne:



where R_1 represents a linkage to the backbone of the polymer.

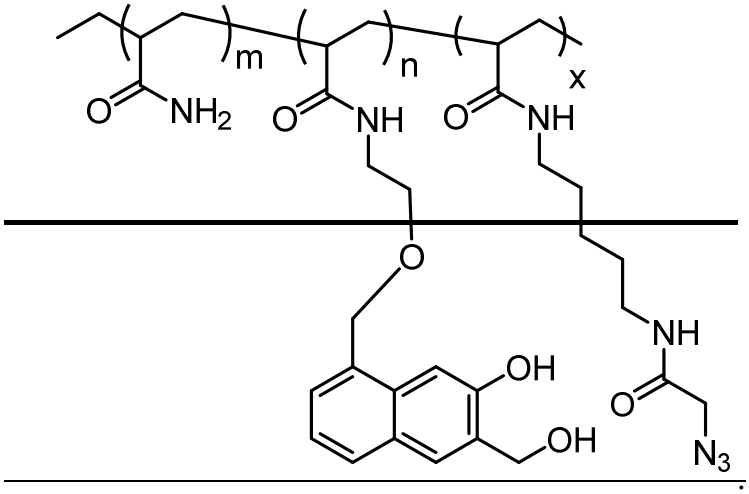
32. The method of claim 31, further reacting the dibenzocyclooctyne with an azide (N_3) coupled to an oligonucleotide (R_2) to form a tetrazole having the structure:



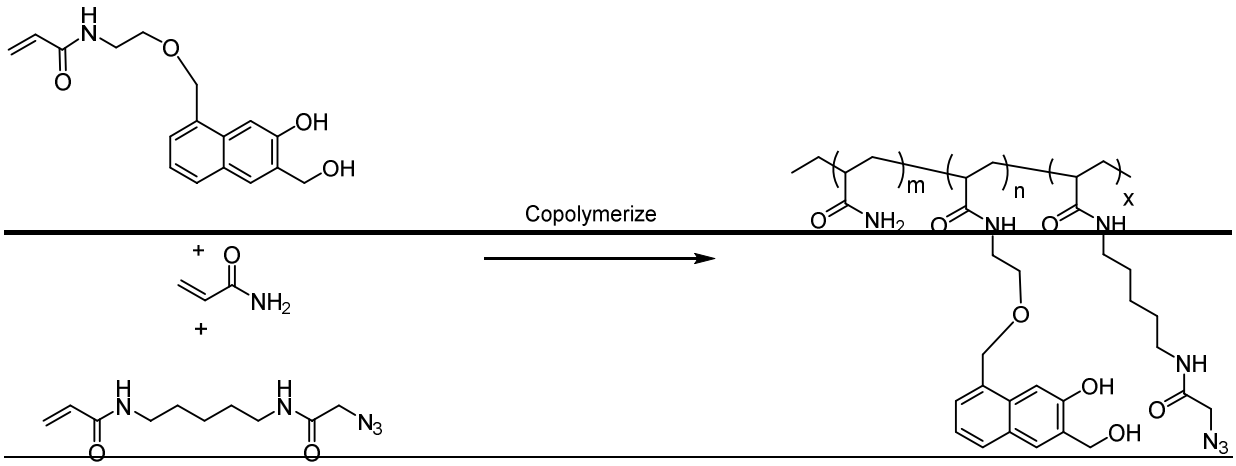
33. A composition made by coupling a polymer to a substrate using the method of claim 29.

34. A composition, comprising the polymer of any one of claims 23, 24, or 27 disposed on a substrate.

35. A polymer having the structure:



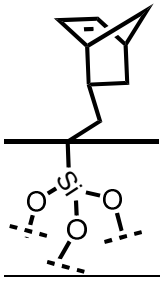
36. A method of making a polymer, the method comprising the radical-induced copolymerization reaction:



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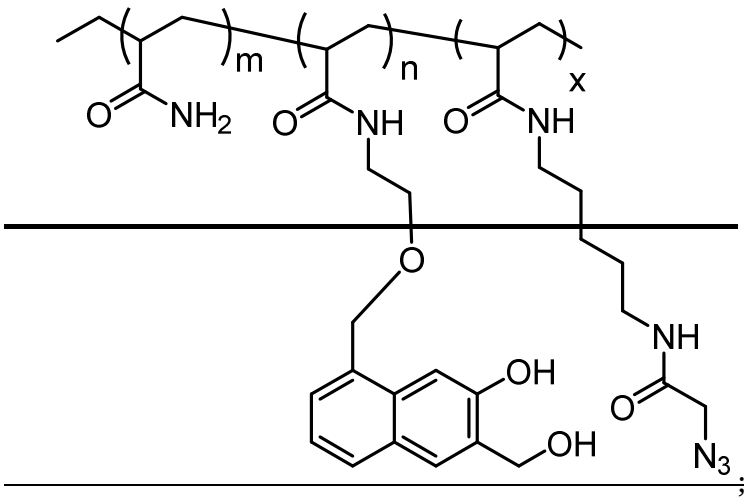
37. A method of functionalizing a substrate, the method comprising:

providing a substrate comprising norbornene groups:



where the dotted lines represent the surface of the substrate;

depositing onto the substrate a polymer comprising the structure:



; and

~~reacting the azide (N_3) groups of the polymer with the norbornene groups to couple the polymer to the substrate.~~

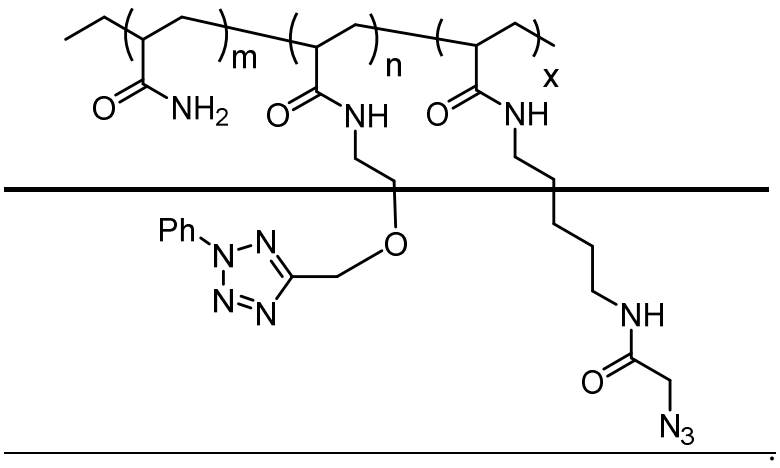
~~38. A composition made by coupling a polymer to a substrate using the method of claim 37.~~

~~39. A method of functionalizing a polymer, the method comprising:~~

~~converting the 3-(hydroxymethyl)-2-naphthol of the composition of claim 38 to an active moiety using light; and~~

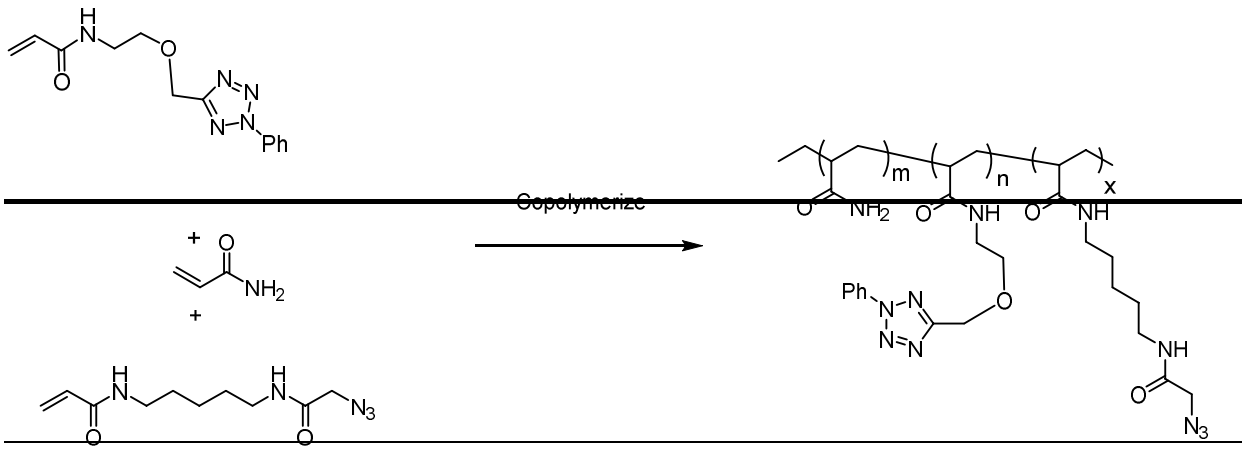
~~reacting the active moiety with azide-coupled oligonucleotides to couple the oligonucleotides to the polymer.~~

~~40. A polymer having the structure:~~



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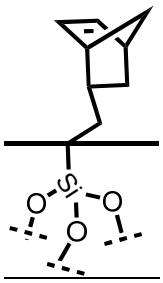
41. A method of making a polymer, the method comprising the radical-induced copolymerization reaction:



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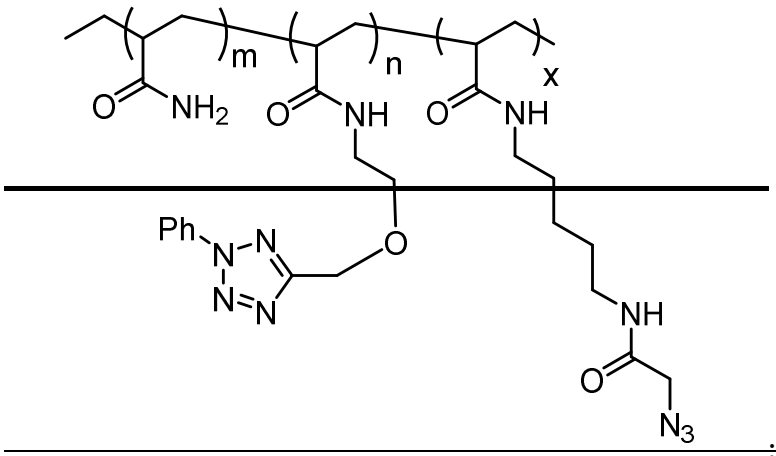
42. A method of functionalizing a substrate, the method comprising:

providing a substrate comprising norbornene groups:



where the dotted lines represent the surface of the substrate;

depositing onto the substrate a polymer comprising the structure:



; and

~~reacting the azide (N_3) groups of the polymer with the norbornene groups to couple the polymer to the substrate.~~

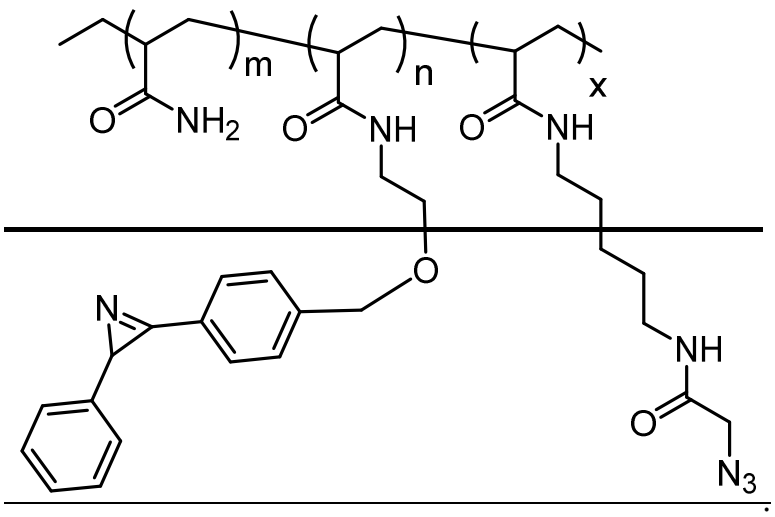
~~43. A composition made by coupling a polymer to a substrate using the method of claim 42.~~

~~44. A method of functionalizing a polymer, the method comprising:~~

~~converting the tetrazole of the composition of claim 43 to a nitrile imine active moiety using light; and~~

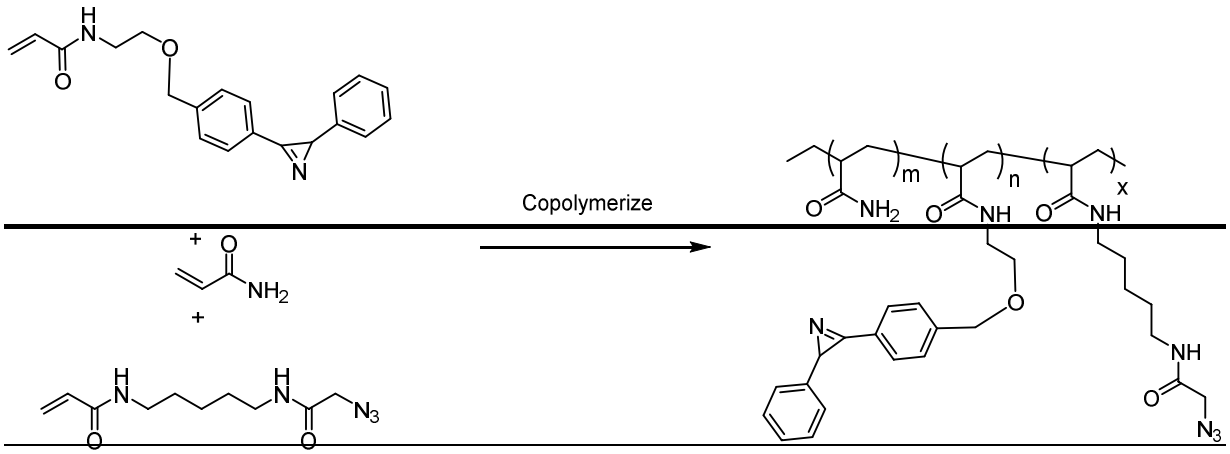
~~reacting the nitrile imine active moiety with azide-coupled oligonucleotides to couple the oligonucleotides to the polymer.~~

~~45. A polymer having the structure:~~



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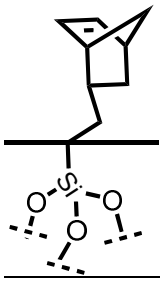
~~46. A method of making a polymer, the method comprising the radical-induced copolymerization reaction:~~



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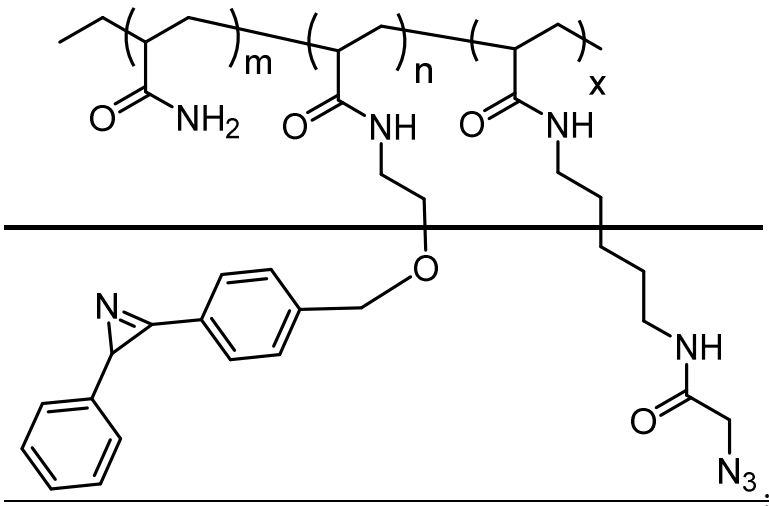
~~47. A method of functionalizing a substrate, the method comprising:~~

~~providing a substrate comprising norbornene groups:~~



~~where the dotted lines represent the surface of the substrate;~~

~~depositing onto the substrate a polymer comprising the structure:~~



; ~~and~~

reacting the azide (N_3) groups of the polymer with the norbornene groups to couple the polymer to the substrate.

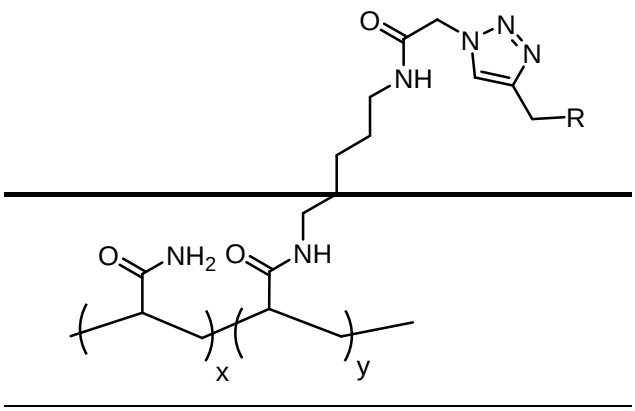
48. A composition made by coupling a polymer to a substrate using the method of claim 42.

49. A method of functionalizing a polymer, the method comprising:

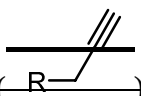
converting the 2H-azirine of the composition of claim 43 to a nitrile ylide active moiety using light; and

reacting the nitrile ylide active moiety with azide-coupled oligonucleotides to couple the oligonucleotides to the polymer.

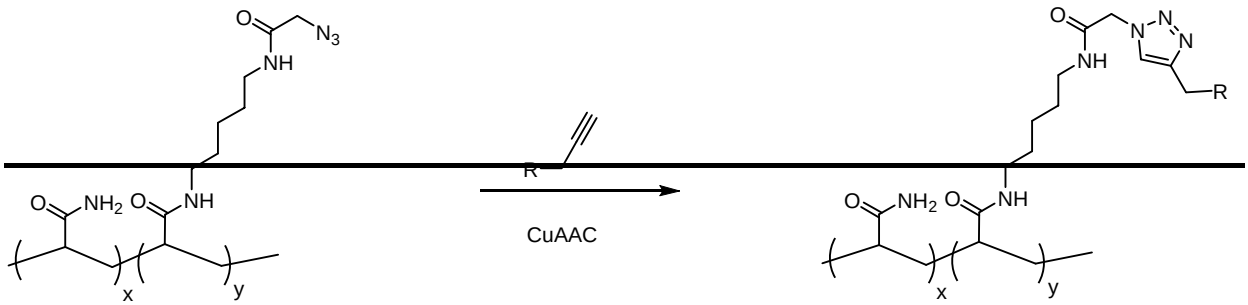
50. A polymer having the structure:

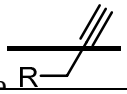


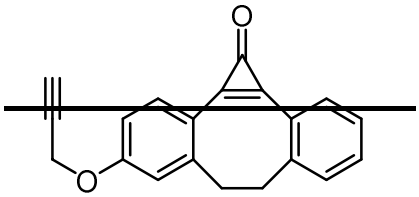
where R is selected from the group consisting of a cyclopropenone-masked dibenzocyclooctyne, a tetrazole, a 3-(hydroxymethyl)-2-naphthol, and a 2H-azirine.

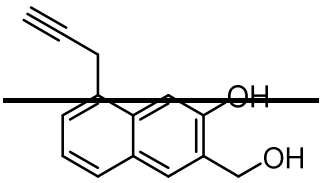
51. A method of making a polymer, the method comprising the click chemistry reaction of poly(N-(5-azidoacetamidylpentyl) acrylamide-co-acrylamide) (PAZAM) with a functionalized alkyne (

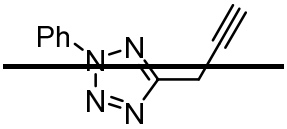
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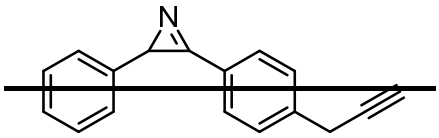
where  is selected from the group consisting of:



, 

, 

, and



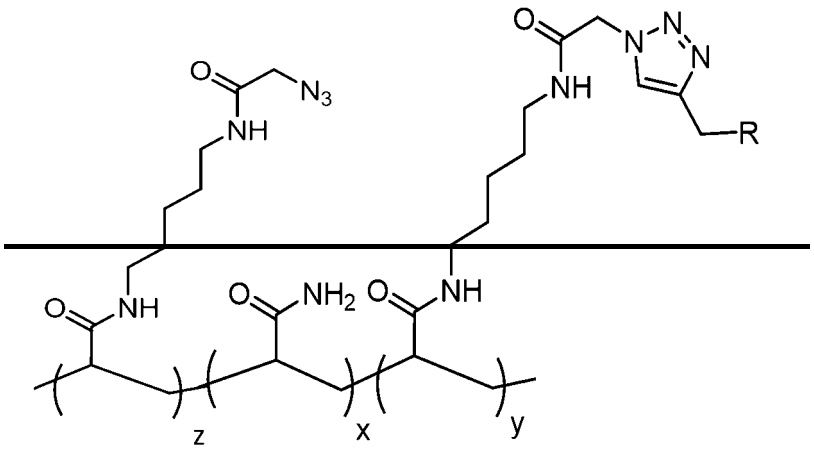
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52. A method of functionalizing a polymer, the method comprising:

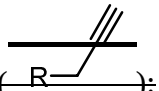
using light to convert the cyclopropenone-masked dibenzocyclooctyne, tetrazole, 3-(hydroxymethyl)-2-naphthol, or 2H-azirine of the polymer of claim 51 to an active moiety; and

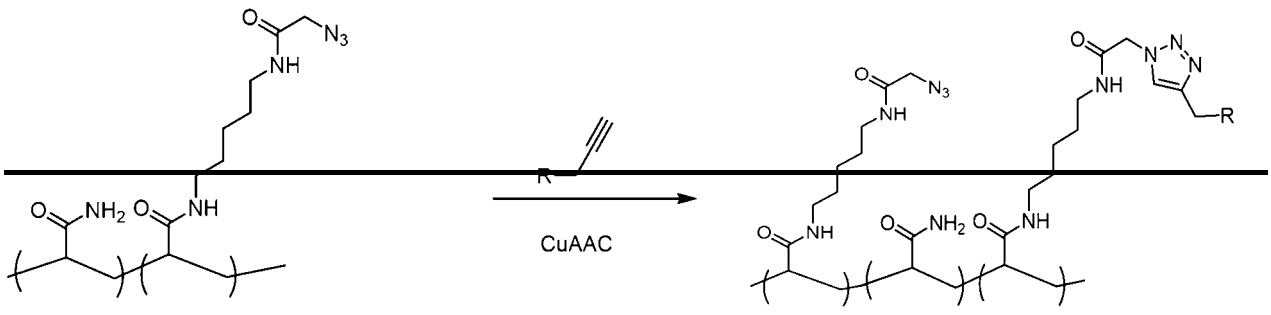
reacting the active moiety with azide-coupled oligonucleotides to couple the oligonucleotides to the polymer.

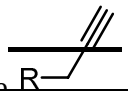
53. A polymer having the structure:

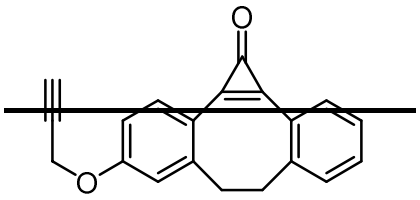


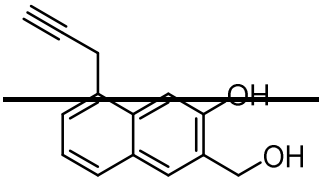
where R is selected from the group consisting of a cyclopropenone-masked dibenzocyclooctyne, a tetrazole, a 3-(hydroxymethyl)-2-naphthol, and a 2H-azirine.

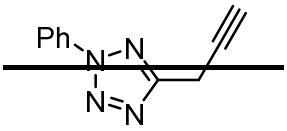
54. A method of making a polymer, the method comprising the click chemistry reaction of an azide functional polymer with a functionalized alkyne ():



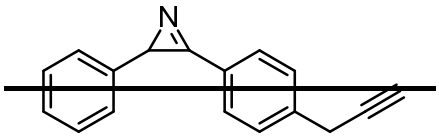
where  is selected from the group consisting of:







, , , and



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55. A method of functionalizing a polymer, the method comprising:

using light to convert the cyclopropenone-masked dibenzocyclooctyne, tetrazole, 3-(hydroxymethyl)-2-naphthol, or 2H-azirine of the polymer of claim 53 to an active moiety; and

reacting the active moiety with azide-coupled oligonucleotides to couple the oligonucleotides to the polymer.

56. A method of making a functional polymer coated surface wherein a norbornene silanized surface is reacted with azide functional polymer and then remaining azide groups are reacted with an inactive moiety coupled to an azide reactive group.

57. The method of claim 56, wherein the azide reactive group comprises an alkyne group.

58. The method of claim 56 or claim 57, wherein the inactive moiety is selected from the group consisting cyclopropenone-masked dibenzocyclooctyne, tetrazole, 3-(hydroxymethyl)-2-naphthol, and 2H-azirine.