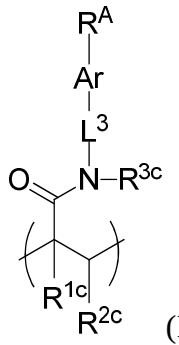
CLAIMS

1. A substrate having a first surface comprising a polymer covalently bonded thereto, wherein the polymer comprises a recurring unit of Formula (IV):



(IV)

wherein each of R^{1c} and R^{2c} is independently hydrogen, optionally substituted alkyl, or optionally substituted phenyl;

R^{3c} is hydrogen, optionally substituted alkyl, optionally substituted phenyl, or optionally substituted C_{7-14} aralkyl;

Ar is an optionally substituted C_{6-10} arylene or an optionally substituted 5 or 6 membered heteroarylene;

R^A is optionally substituted tetrazinyl; and

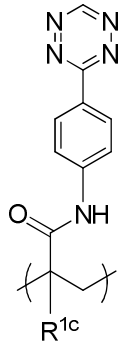
L^3 is a single bond, an optionally substituted alkylene linker, or an optionally substituted heteroalkylene linker; and

wherein the polymer is covalently bonded to the first surface at R^A of the recurring unit of Formula (IV).

2. The substrate of Claim 1, wherein R^{1c} is hydrogen or optionally substituted alkyl and each R^{2c} and R^{3c} is hydrogen.

3. The substrate of Claim 1, wherein Ar is an optionally substituted phenylene.

4. The substrate of Claim 1, wherein the recurring unit of Formula (IV) is represented by Formula (IVa):

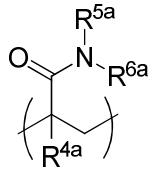


(IVa)

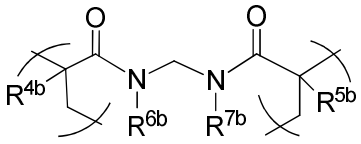
wherein R^{1c} is selected from hydrogen or methyl.

5. The substrate of Claim 1, wherein the polymer further comprises one or more recurring units included in a compound selected from the group consisting of polyacrylamides, polyacrylates, and polyacroleins, and combinations thereof.

6. The substrate of Claim 5, wherein the polymer further comprises one or more recurring units of Formula (IIIa) or (IIIb) or both:



(IIIa)

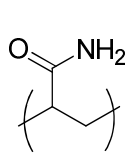


(IIIb)

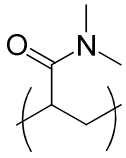
wherein each R^{4a}, R^{4b} and R^{5b} is independently hydrogen or C_{1-3} alkyl; and

each R^{5a}, R^{6a}, R^{6b} and R^{7b} is independently hydrogen, optionally substituted C_{1-6} alkyl, or optionally substituted phenyl.

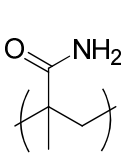
7. The substrate of Claim 6, wherein the recurring unit of Formula (IIIa) is represented by (IIIa1), (IIIa2) or (IIIa3):



(IIIa1),

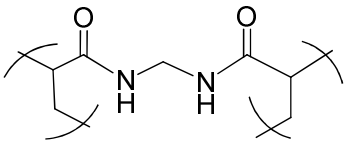


(IIIa2),

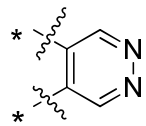
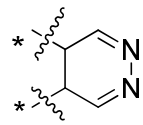
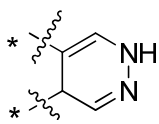


(IIIa3).

8. The substrate of Claim 6, wherein the recurring unit of Formula (IIIb) is represented by (IIIb1):

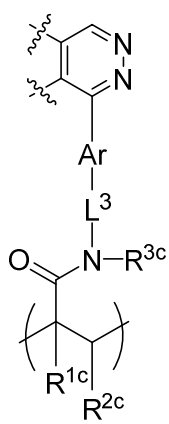
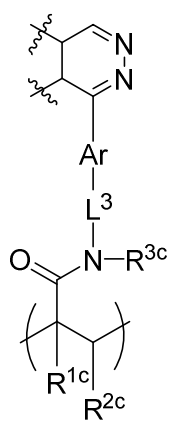
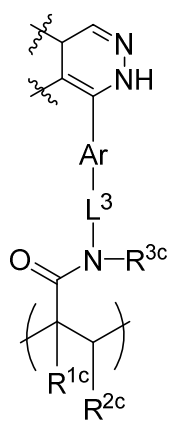
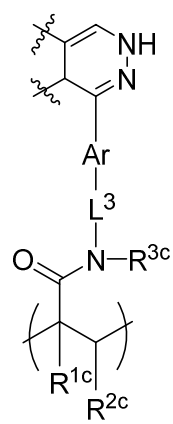

(IIIb1).

9. The substrate of Claim 8, wherein the first surface of the substrate comprises functionalized silane comprising unsaturated moieties selected from the group consisting of cycloalkenyl, cycloalkynyl, heterocycloalkenyl, and heterocycloalkynyl, and combinations thererof.

10. The substrate of Claim 9, wherein the covalent bonding between the polymer and the first surface of the substrate comprises the structure moiety  ,  , or  , or combinations thereof, and wherein * indicates the polymer's point of connection with the first surface.

11. The substrate of Claim 9, further comprising functionalized oligonucleotides covalently bonded to R^A of the recurring unit of Formula (IV) of the polymer.

12. The substrate of claim 11, wherein the polymer comprises modified recurring units of the structure:

 ,  ,  , or  ,

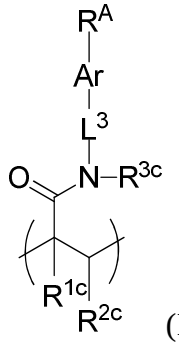
wherein the covalent bonding position with the functionalized nucleotide is shown by a bond with a wavy line.

13. The substrate of Claim 11, wherein the functionalized oligonucleotides are covalently bonded to the polymer through reaction of one or more functional moieties on the functionalized oligonucleotides with optionally substituted tetrazinyl, and wherein the functional moieties comprises alkynyl, cycloalkenyl, cycloalkynyl, heterocycloalkenyl, heterocycloalkynyl, or optionally substituted variants or combinations thereof.

14. The substrate of Claim 13, wherein the functional moieties comprise alkynyl or optionally substituted variants thereof.

15. The substrate of Claim 1, comprising both polymer coated regions and inert regions.

16. A polymer for surface functionalization, wherein the polymer comprises a recurring unit of Formula (IV):



(IV)

wherein each of R^{1c} and R^{2c} is independently hydrogen, optionally substituted alkyl, or optionally substituted phenyl;

R^{3c} is hydrogen, optionally substituted alkyl, optionally substituted phenyl, or optionally substituted C_{7-14} aralkyl;

Ar is an optionally substituted C_{6-10} arylene or an optionally substituted 5 or 6 membered heteroarylene;

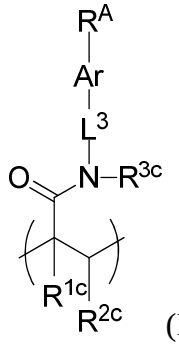
R^A is optionally substituted tetrazinyl; and

L^3 is a single bond, an optionally substituted alkylene linker, or an optionally substituted heteroalkylene linker.

17. A method for immobilizing a polymer to a first surface of a substrate, comprising:

contacting a polymer comprising a recurring unit of Formula (IV) with the first surface of the substrate, said first surface comprising a first plurality of functional groups covalently attached thereto; and

reacting the first plurality of functional groups of the first surface with the polymer, thereby covalently bonding R^A of the recurring unit of Formula (IV) of the polymer to the first surface of the substrate;



(IV)

wherein each of R^{1c} and R^{2c} is independently hydrogen, optionally substituted alkyl, or optionally substituted phenyl;

R^{3c} is hydrogen, optionally substituted alkyl, optionally substituted phenyl, or optionally substituted C_{7-14} aralkyl;

Ar is an optionally substituted C_{6-10} arylene or an optionally substituted 5 or 6 membered heteroarylene;

R^A is optionally substituted tetrazinyl; and

L^3 is a single bond, an optionally substituted alkylene linker, or an optionally substituted heteroalkylene linker.

18. The method of Claim 17, wherein the first plurality of functional groups of the first surface comprise vinyl, acryloyl, alkenyl, cycloalkenyl, heterocycloalkenyl, alkynyl, cycloalkynyl, heterocycloalkynyl, hydrazinyl, or optionally substituted variants, or combinations thereof.

19. The method of Claim 17, wherein the first plurality of functional groups comprise norbornene groups.