each of m^2 and n^2 is an integer from 0 to 1000, provided that the sum of $m^2 + n^2$ is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

R^{3a} and R^{3b} are each independently a methylene or ethylene group;

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

A^1 and A^2 are each independently a group of formula

$$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2{}_2 ;$$

$$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2{}_2]_2;$$

$$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]_{r2}R^2\}; \text{ or}$$

$$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2{}_2]_2\}_2,$$

B1 and B2 are each independently

$$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2\text{-}(CH_2)_{s1}\text{-}R^4\text{-}R^5;$$

$$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2\text{-}(CH_2)_{s2}\text{-}R^4\text{-}R^5]_2;$$

$$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]_{r2}(CH_2)_{s3}\text{-}R^4\text{-}R^5\};$$

$$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2\text{-}(CH_2)_{s4}\text{-}R^4\text{-}R^5]_2\}_2;$$

$$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2\text{-}CH_2\text{-}CHOH\text{-}R^5;$$

$$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2\text{-}CH_2\text{-}CHOH\text{-}R^5]_2;$$

$$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]_{r2}\text{-}CH_2\text{-}CHOH\text{-}R^5\};$$

$$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2\text{-}CH_2\text{-}CHOH\text{-}R^5]_2\}_2;$$

$$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2\text{-}(CH_2)_{s1}\text{-}R^5;$$

$$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2\text{-}(CH_2)_{s2}\text{-}R^5]_2;$$

$$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]_{r2}(CH_2)_{s3}\text{-}R^5\};$$

$$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2\text{-}(CH_2)_{s4}\text{-}R^5]_2\}_2;$$

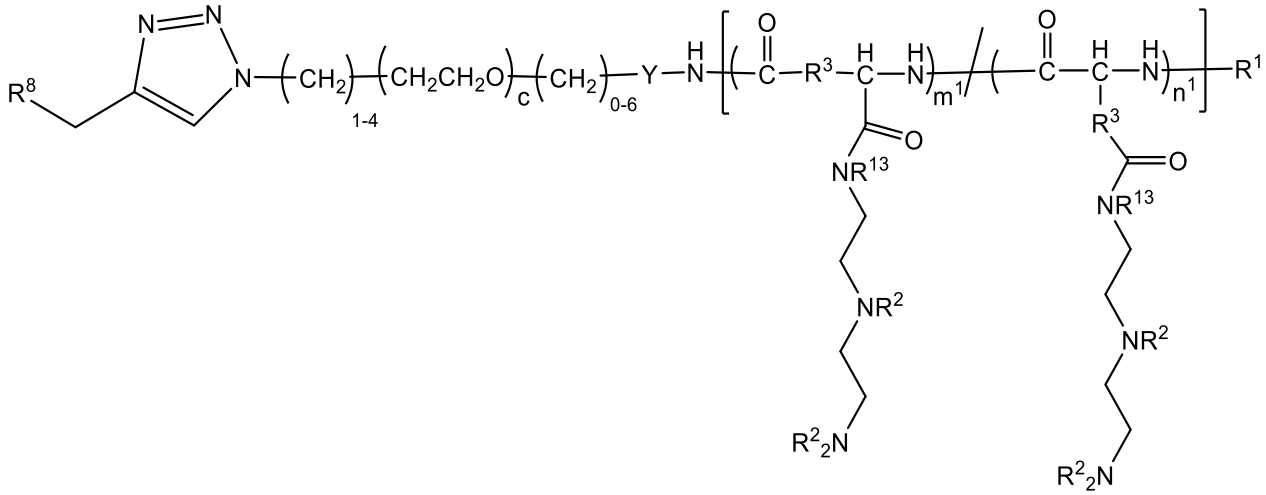
$$—(CH_2)_{p1}—[N\{(CH_2)_{s1}\text{-}R^4\text{-}R^5\}—(CH_2)_{q1}—]_{r1}NR^2{}_2; \text{ or}$$

$$—(CH_2)_{p1}—[N\{(CH_2)_{s1}\text{-}R^5\}—(CH_2)_{q1}—]_{r1}NR^2{}_2,$$

wherein p1 to p4, q1 to q6, r1 and r2, and s1 to s4 are each independently an integer of 1 to 5; each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group; each instance of R^4 is independently -C(O)O-, -C(O)NH-, or -S(O)(O)-; and each instance of R^5 is independently a substituted or unsubstituted alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1

to 8 (e.g., 2 to 8) secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety.

[0005] Also provided is a polymer of Formula 2:



wherein:

each of m^1 and n^1 is an integer from 0 to 1000, provided that the sum of m^1 and n^1 is 10 to 2000;

c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker;

R^1 is hydrogen, an aryl group, a heterocyclic group (e.g., aromatic or non-aromatic), a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, or a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more substituents, such as one or more amines;

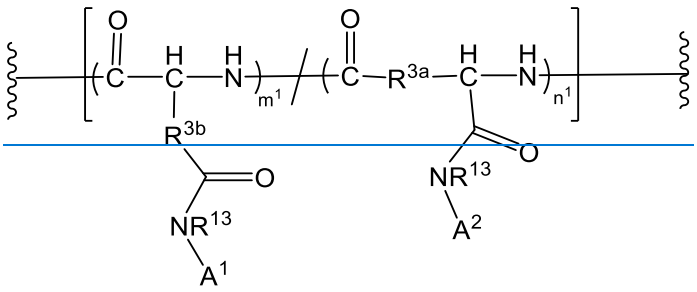
each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

R^8 is a is a tissue-specific or cell-specific targeting moiety; and

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group.

[0006] The disclosure also provides a composition comprising a structure of Formula 1 and/or a polymer of Formula 2, and a nucleic acid and/or polypeptide. Further provided is a method of preparing a polymer comprising a structure of Formula 1 or a polymer of Formula 2, as well as methods of using the polymers and compositions comprising same, for example, to deliver a nucleic acid or protein to a cell.

~~**[0006a]** In one aspect, the present disclosure provides a polymer comprising a structure of Formula 4:~~



~~wherein,~~

~~each of m^1 and n^1 is an integer from 0 to 1000; provided that the sum of m^1 + n^1 is greater than 2;~~

~~the symbol "/" indicates that the units separated thereby are linked randomly or in any order;~~

~~A^1 and A^2 are each independently a group of formula~~

~~$-(CH_2)_{p1}-[NR^2-(CH_2)_{q1}-]_{r1}NR^2_2$;~~

~~$-(CH_2)_{p2}-N[-(CH_2)_{q2}-NR^2_2]_2$;~~

~~$-(CH_2)_{p3}-N\{[-(CH_2)_{q3}-NR^2_2][-(CH_2)_{q4}-NR^2-]_{r2}R^2\}$; or~~

~~$-(CH_2)_{p4}-N\{-(CH_2)_{q5}-N[-(CH_2)_{q6}-NR^2_2]_2\}_2$;~~

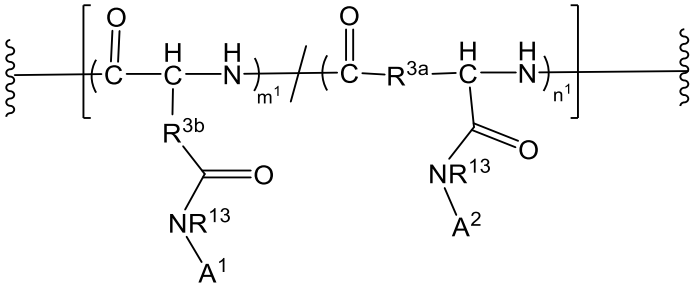
~~wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5;~~

~~each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, provided that A^1 and A^2 each comprise at least one tertiary amine;~~

~~R^{3a} and R^{3b} are each independently a methylene or ethylene group; and~~

~~each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group.~~

[~~0006b~~0006a] In another aspect, there is provided a method of preparing a polymer as described herein, the method comprising modifying at least a portion of groups A^1 and/or A^2 of a polymer comprising a structure of Formula 3:



wherein:

each of m^1 and n^1 is an integer from 0 to 1000, provided that $m^1 + n^1$ is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

R^{3a} and R^{3b} are each independently a methylene or ethylene group;

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

A^1 and A^2 are each independently a group of formula

$$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2{}_2 ;$$

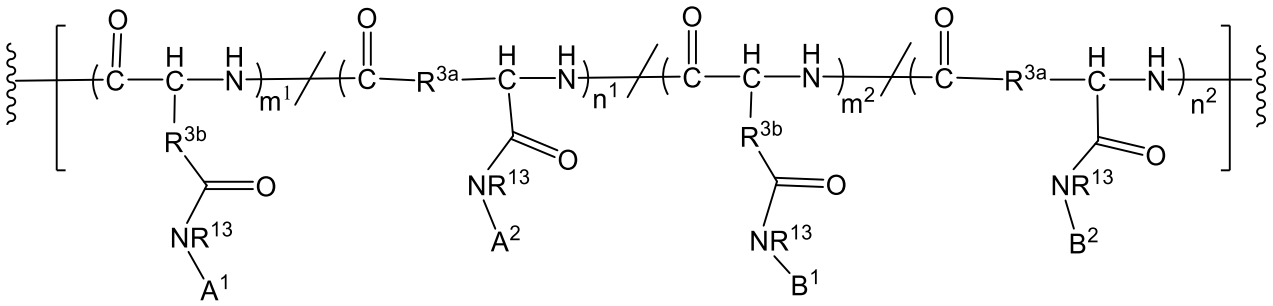
$$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2{}_2]_2;$$

$$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]r_2R^2\}; \text{ or}$$

$$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2{}_2]_2\}_2,$$

wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5; and each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group,

to produce a polymer comprising a structure of Formula 1:



wherein:

each of m^1 and n^1 is an integer from 0 to 1000;

each of m^2 and n^2 is an integer from 0 to 1000, provided that the sum of $m^2 + n^2$ is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order; R^{3a} and R^{3b} are each independently a methylene or ethylene group;

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

A^1 and A^2 are each independently a group of formula

$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2{}_2$;

$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2{}_2]_2$;

$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]_{r2}R^2\}$; or

$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2{}_2]_2\}_2$,

B^1 and B^2 are each independently

$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2\text{-}(CH_2)_{s1}\text{-}R^4\text{-}R^5$;

$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2\text{-}(CH_2)_{s2}\text{-}R^4\text{-}R^5]_2$;

$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]_{r2}(CH_2)_{s3}\text{-}R^4\text{-}R^5\}$;

$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2\text{-}(CH_2)_{s4}\text{-}R^4\text{-}R^5]_2\}_2$;

$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2\text{-}CH_2\text{-}CHOH\text{-}R^5$;

$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2\text{-}CH_2\text{-}CHOH\text{-}R^5]_2$;

$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]_{r2}\text{-}CH_2\text{-}CHOH\text{-}R^5\}$;

$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2\text{-}CH_2\text{-}CHOH\text{-}R^5]_2\}_2$;

$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2\text{-}(CH_2)_{s1}\text{-}R^5$;

$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2\text{-}(CH_2)_{s2}\text{-}R^5]_2$;

$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2{}_2][—(CH_2)_{q4}—NR^2—]_{r2}(CH_2)_{s3}\text{-}R^5\}$;

$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2\text{-}(CH_2)_{s4}\text{-}R^5]_2\}_2$;

$—(CH_2)_{p1}—[N\{(CH_2)_{s1}\text{-}R^4\text{-}R^5\}—(CH_2)_{q1}—]_{r1}NR^2{}_2$; or

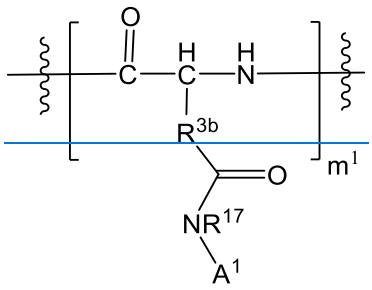
$—(CH_2)_{p1}—[N\{(CH_2)_{s1}\text{-}R^5\}—(CH_2)_{q1}—]_{r1}NR^2{}_2$,

wherein p1 to p4, q1 to q6, r1 and r2, and s1 to s4 are each independently an integer of 1 to 5; each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group; each instance of R^4 is independently -C(O)O-, -C(O)NH-, or -S(O)(O)-; and each instance of R^5 is independently an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety.

[~~0006c~~0006b] In yet another aspect, there is provided a composition comprising a polymer as described herein and a nucleic acid and/or polypeptide.

[~~0006d~~0006c] In a further aspect, there is provided a method of delivering a nucleic acid and/or polypeptide to a cell, the method comprising administering the composition as described herein to the cell.

~~**[0006e]** In another aspect, there is provided a method of preparing a polymer comprising a structure of Formula 5:~~



~~wherein,~~

~~m^1 is an integer from 1 to 2000;~~

~~R^{3b} is a methylene or ethylene group;~~

~~R^{17} is hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;~~

~~A^1 is a group of formula~~

~~$-(CH_2)_{p1}-[NR^2-(CH_2)_{q1}-]_{r1}NR^2_2$;~~

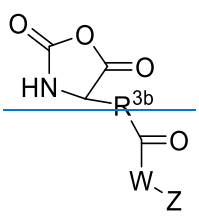
~~$-(CH_2)_{p2}-N[-(CH_2)_{q2}-NR^2_2]_2$;~~

~~$-(CH_2)_{p3}-N\{[-(CH_2)_{q3}-NR^2_2][-(CH_2)_{q4}-NR^2-]_{r2}R^2\}$; or~~

~~$-(CH_2)_{p4}-N\{-(CH_2)_{q5}-N[-(CH_2)_{q6}-NR^2_2]_2\}_2$;~~

~~wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5; and each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group,~~

~~from a compound of Formula A:~~



wherein,

R^{3b} is a methylene or ethylene group;

W is $-NR^{14}-$ or $-O-$, wherein R^{14} is hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

Z is A^1, or an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, arylalkyl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety;

A^1 is a group of formula

$-(CH_2)_{p1}-[NR^2-(CH_2)_{q1}-]_{r1}NR^2_2$;

$-(CH_2)_{p2}-N[-(CH_2)_{q2}-NR^2_2]_2$;

$-(CH_2)_{p3}-N\{[-(CH_2)_{q3}-NR^2_2][-(CH_2)_{q4}-NR^2-]_{r2}R^2\}$; or

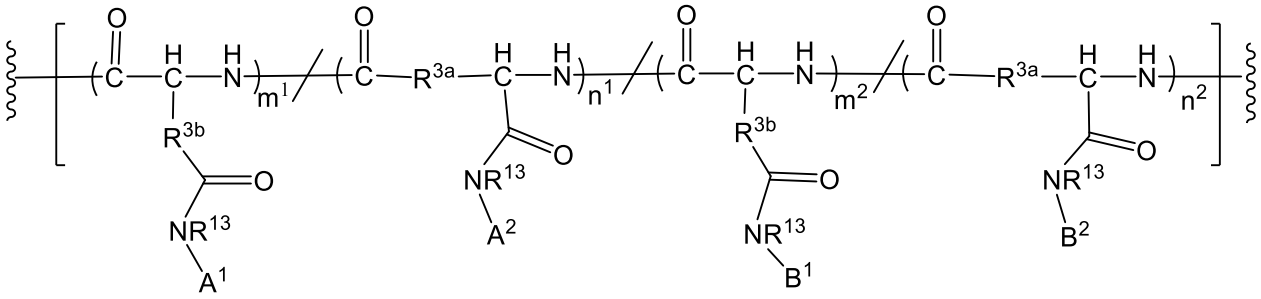
$-(CH_2)_{p4}-N\{-(CH_2)_{q5}-N[-(CH_2)_{q6}-NR^2_2]_2\}_2$,

wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5; and each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group,

the method comprising a ring-opening polymerization of the compound Formula A.

CLAIM(S):

1. A polymer comprising a structure of Formula 1:



wherein:

each of m^1 and n^1 is an integer from 0 to 1000;

each of m^2 and n^2 is an integer from 0 to 1000, provided that the sum of $m^2 + n^2$ is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

R^{3a} and R^{3b} are each independently a methylene or ethylene group;

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

A^1 and A^2 are each independently a group of formula

—$(CH_2)_{p1}$—[NR^2—$(CH_2)_{q1}$—]$_{r1}NR^2{}_2$;

—$(CH_2)_{p2}$—N[—$(CH_2)_{q2}$—$NR^2{}_2$]$_2$;

—$(CH_2)_{p3}$—N{[—$(CH_2)_{q3}$—$NR^2{}_2$][—$(CH_2)_{q4}$—NR^2—]$_{r2}R^2$}; or

—$(CH_2)_{p4}$—N{—$(CH_2)_{q5}$—N[—$(CH_2)_{q6}$—$NR^2{}_2$]$_2$}$_2$,

B^1 and B^2 are each independently

—$(CH_2)_{p1}$—[NR^2—$(CH_2)_{q1}$—]$_{r1}NR^2$-$(CH_2)_{s1}$-R^4-R^5;

—$(CH_2)_{p2}$—N[—$(CH_2)_{q2}$—NR^2-$(CH_2)_{s2}$-R^4-R^5]$_2$;

—$(CH_2)_{p3}$—N{[—$(CH_2)_{q3}$—$NR^2{}_2$][—$(CH_2)_{q4}$—NR^2—]$_{r2}(CH_2)_{s3}$-R^4-R^5};

—$(CH_2)_{p4}$—N{—$(CH_2)_{q5}$—N[—$(CH_2)_{q6}$—NR^2-$(CH_2)_{s4}$-R^4-R^5]$_2$}$_2$;

—$(CH_2)_{p1}$—[NR^2—$(CH_2)_{q1}$—]$_{r1}NR^2$-CH_2-CHOH-R^5;

—$(CH_2)_{p2}$—N[—$(CH_2)_{q2}$—NR^2-CH_2-CHOH-R^5]$_2$;

—$(CH_2)_{p3}$—N{[—$(CH_2)_{q3}$—$NR^2{}_2$][—$(CH_2)_{q4}$—NR^2—]$_{r2}$-CH_2-CHOH-R^5};

—$(CH_2)_{p4}$—N{—$(CH_2)_{q5}$—N[—$(CH_2)_{q6}$—NR^2-CH_2-CHOH-R^5]$_2$}$_2$;

—$(CH_2)_{p1}$—[NR^2—$(CH_2)_{q1}$—]$_{r1}NR^2$-$(CH_2)_{s1}$-R^5;

—$(CH_2)_{p2}$—N[—$(CH_2)_{q2}$—NR^2-$(CH_2)_{s2}$-R^5]$_2$;

—$(CH_2)_{p3}$—N{[—$(CH_2)_{q3}$—NR^2_2][—$(CH_2)_{q4}$—NR^2—]$_{r2}$$(CH_2)_{s3}$-$R^5$};

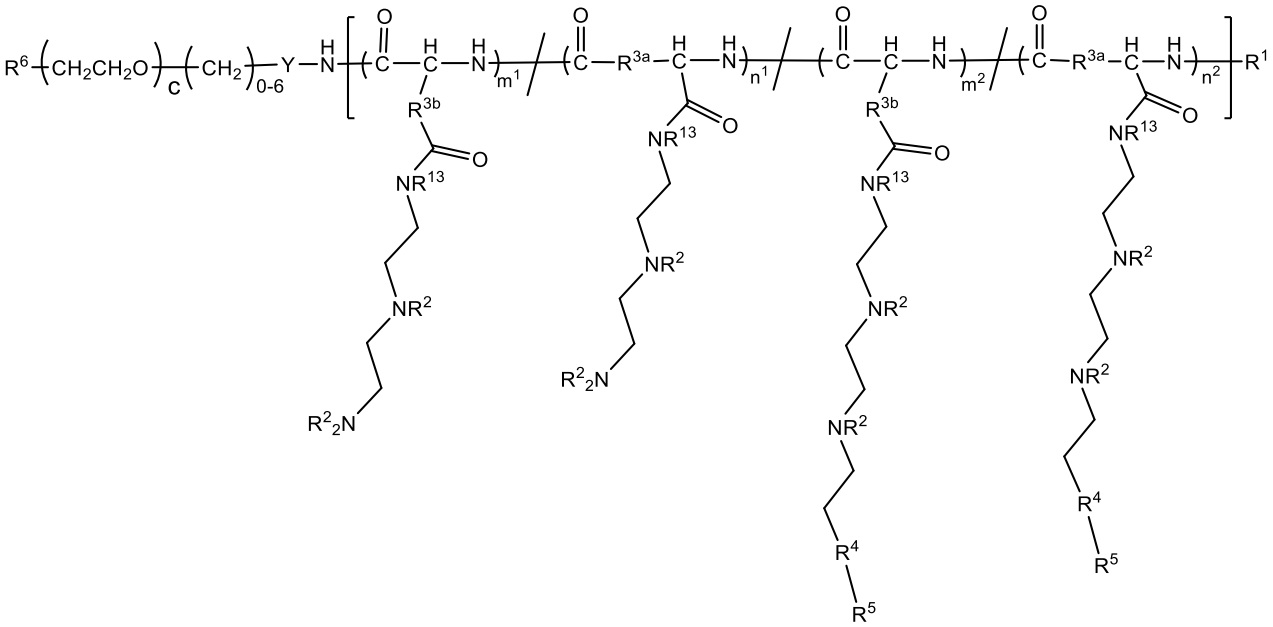
—$(CH_2)_{p4}$—N{—$(CH_2)_{q5}$—N[—$(CH_2)_{q6}$—NR^2-$(CH_2)_{s4}$-R^5]$_2$}$_2$;

—$(CH_2)_{p1}$—[N{$(CH_2)_{s1}$-R^4-R^5}—$(CH_2)_{q1}$—]$_{r1}$$NR^2_2$; or

—$(CH_2)_{p1}$—[N{$(CH_2)_{s1}$-R^5}—$(CH_2)_{q1}$—]$_{r1}$$NR^2_2$,

wherein p1 to p4, q1 to q6, r1 and r2, and s1 to s4 are each independently an integer of 1 to 5; each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group; each instance of R^4 is independently -C(O)O-, -C(O)NH-, or -S(O)(O)-; and each instance of R^5 is independently an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety.

2. The polymer of claim 1 having the structure of Formula 1A:



wherein

c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker;

each of m^1 and n^1 is an integer from 0 to 1000;

each of m^2 and n^2 is an integer from 0 to 1000, provided that the sum of m^2 + n^2 is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

R^1 is hydrogen, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, or a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more substituents;

each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

R^{3a} and R^{3a} are each independently a methylene or ethylene group;

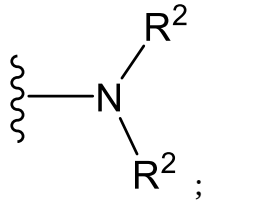
each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

each instance of R^4 is —C(O)O—, —C(O)NH—, or —S(O)(O)—;

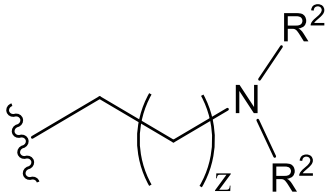
each instance of R^5 is independently an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety; and

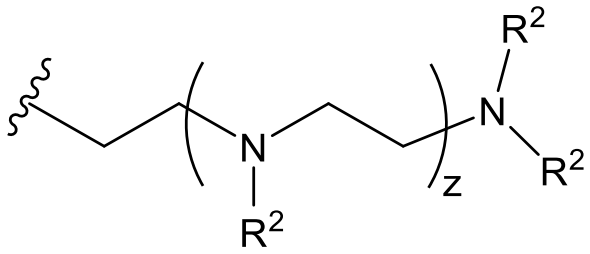
R^6 is hydrogen, an amino group, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more amines; or a tissue-specific or cell-specific targeting moiety.

3. The polymer of claim 1 or 2, wherein each R^5 is independently:

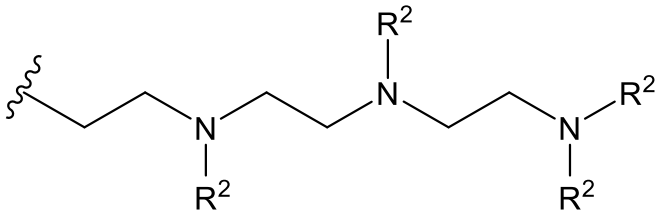


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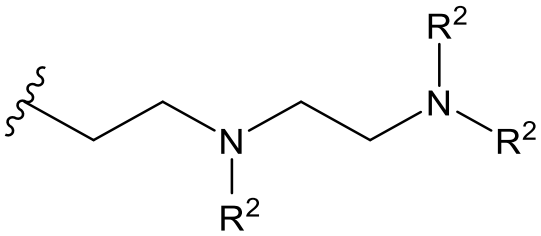




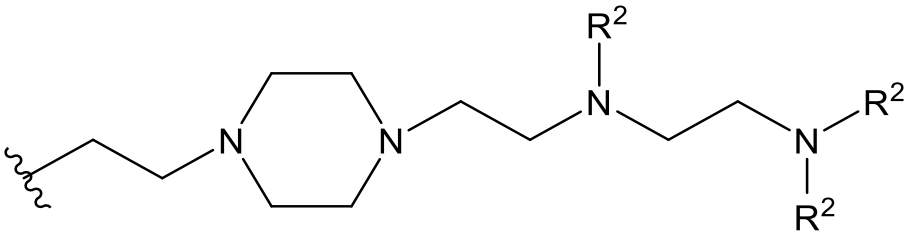
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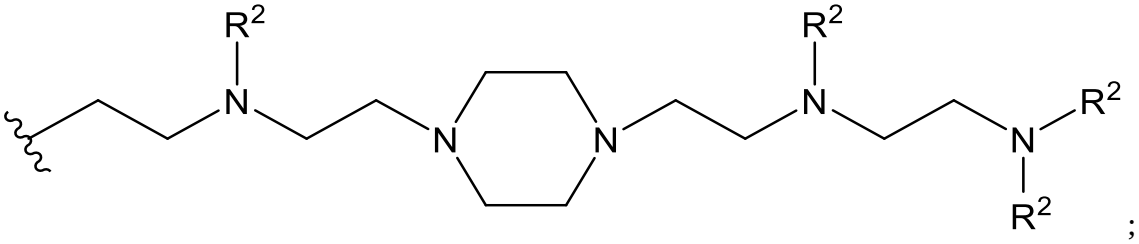
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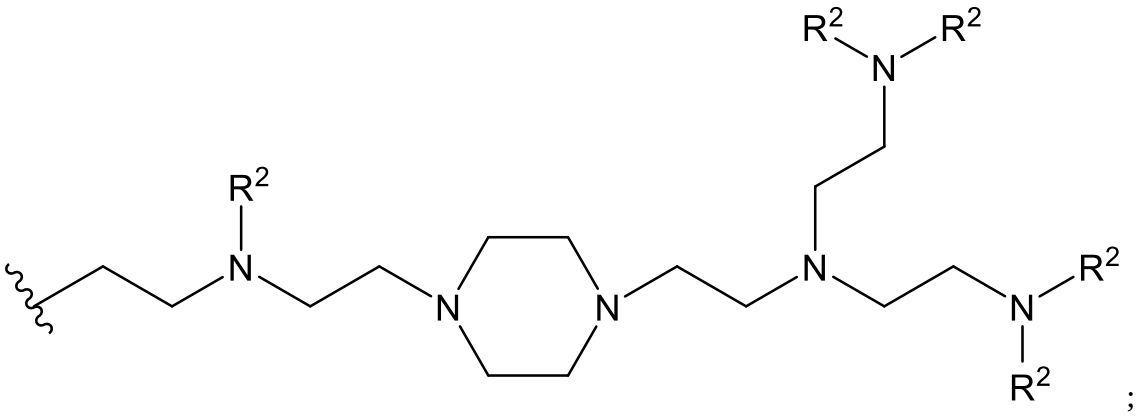
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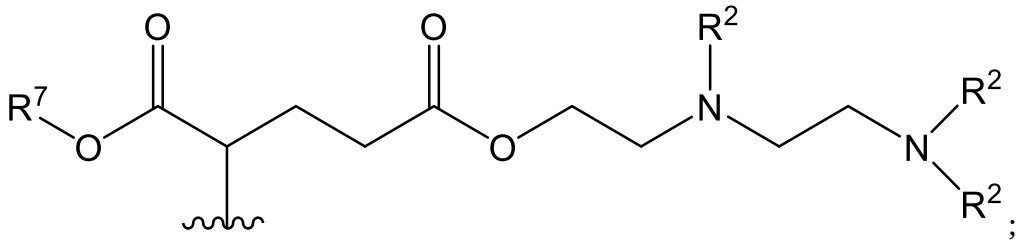
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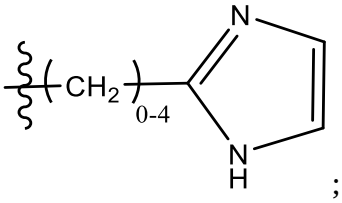
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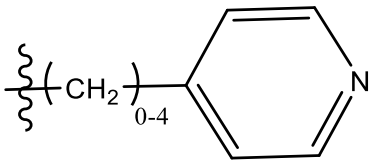
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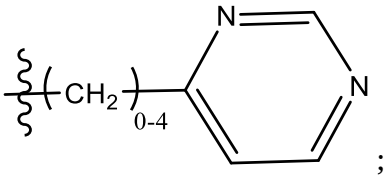
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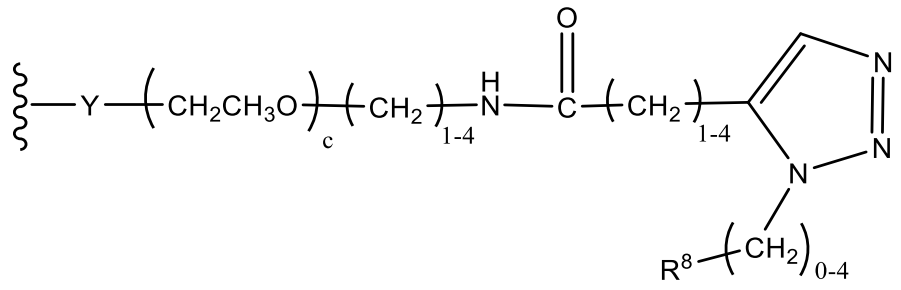
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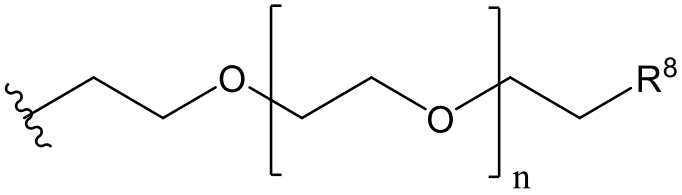
;



;



; and



,

wherein

each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

R^7 is a C_1-C_{50} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group optionally substituted with one or more amines; C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group

z is an integer from 1 to 5;

c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker;

n is an integer from 0 to 50; and

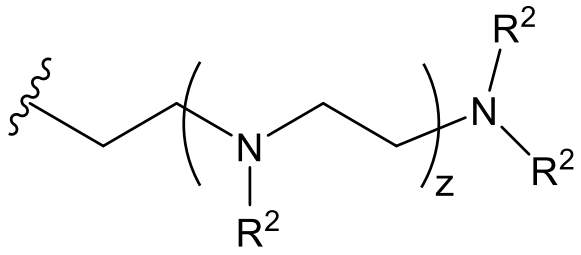
R^8 is a tissue-specific or cell-specific targeting moiety.

4. The polymer of any of claims 1-3, wherein each of A^1 and A^2 is a group of formula —$(CH_2)_{p1}$—[NH—$(CH_2)_{q1}$—]$_{r1}NH_2$, and each of B^1 and B^2 is a group of formula—$(CH_2)_{p1}$—[NH—$(CH_2)_{q1}$—]$_{r1}$NH-$(CH_2)_2$-R^4-R^5.

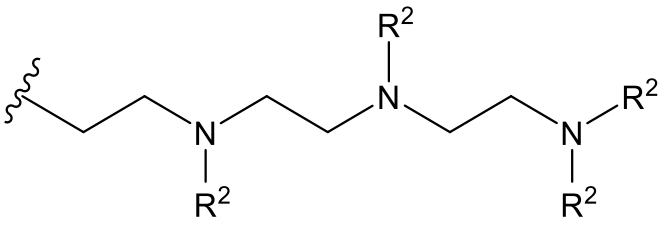
~~4~~5. The polymer of any of claims 1-~~3~~4, wherein each of A^1 and A^2 is a group of formula –$(CH_2)_2$-NH-$(CH_2)_2$-NH_2, and each of B^1 and B^2 is a group of formula–$(CH_2)_2$-NH-$(CH_2)_2$-NH-$(CH_2)_2$-R^4-R^5.

~~5~~6. The polymer of any of claims 1-~~4~~5, wherein R^4 is –C(O)-O-.

~~6~~7. The polymer of any of claims 1-~~5~~6, wherein R^5 is



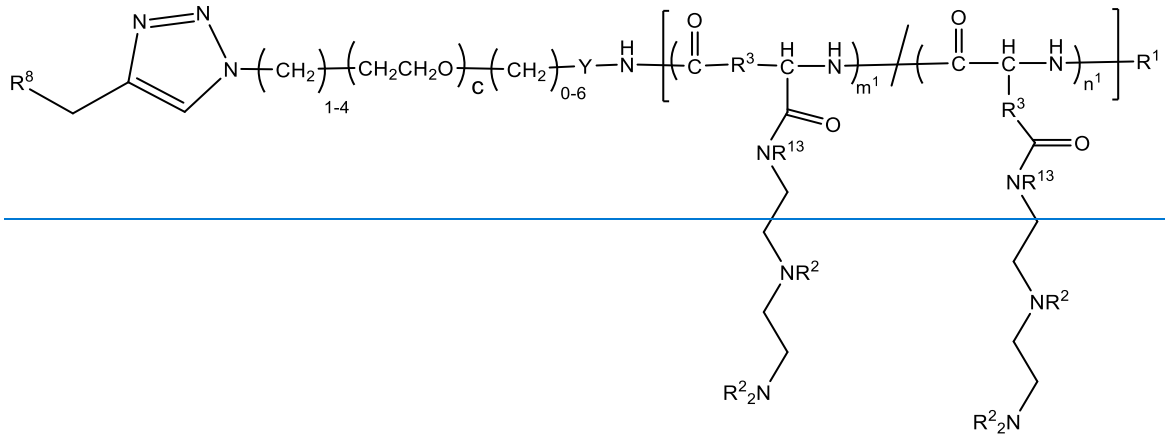
or



.

~~7~~8. A polymer of any of claims 1-~~6~~7, wherein the ratio of $(m^1+n^1)/(m^2+n^2)$ is about 20 or less, and, optionally, about 0.2 or more.

~~8. A polymer of Formula 2:~~



wherein

each of m^1 and n^1 is an integer from 0 to 1000, provided that the sum of m^1 and n^1 is 10 to 2000;

c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker;

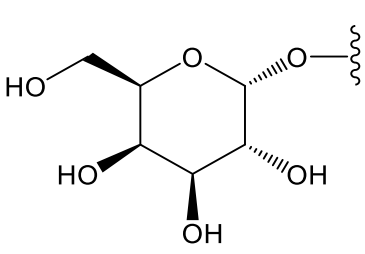
R^1 is hydrogen, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, or a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more substituents;

each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

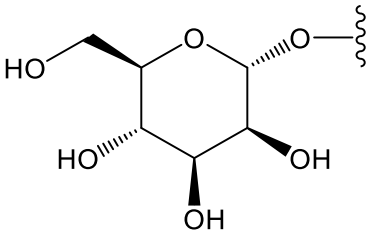
R^8 is a is a tissue-specific or cell-specific targeting moiety; and

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group.

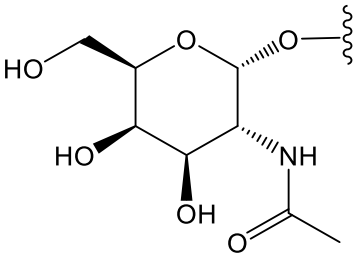
9. The polymer of any one of claims 1-56, 7, or 8, wherein the tissue-specific or cell-specific targeting moiety is:



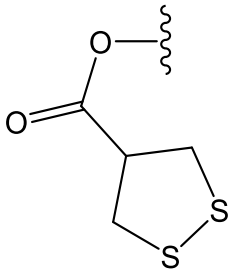
alpha-d-galactose ;



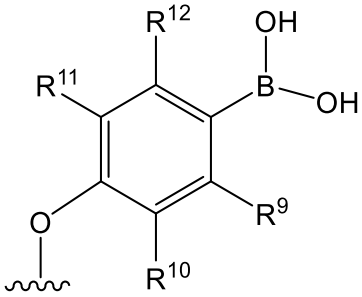
alpha-d-mannose ;



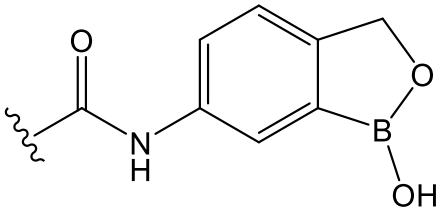
N-acetylgalactosamine ;



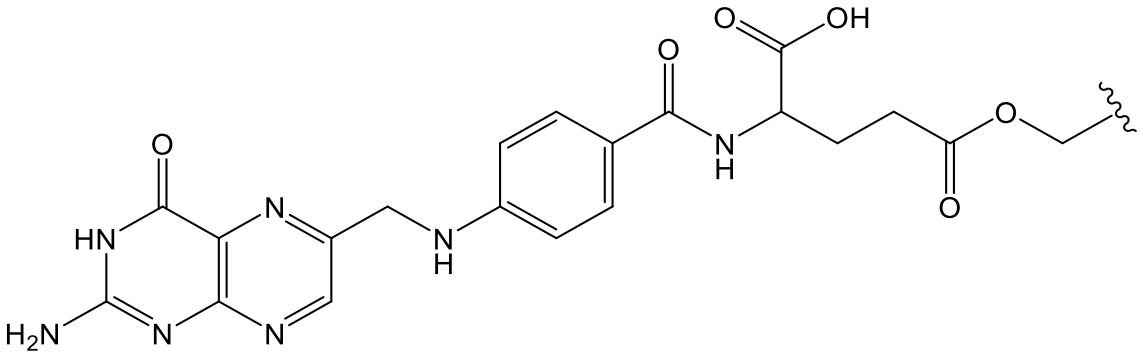
Asparagusic acid ;



Phenylboronic acid ;



; or

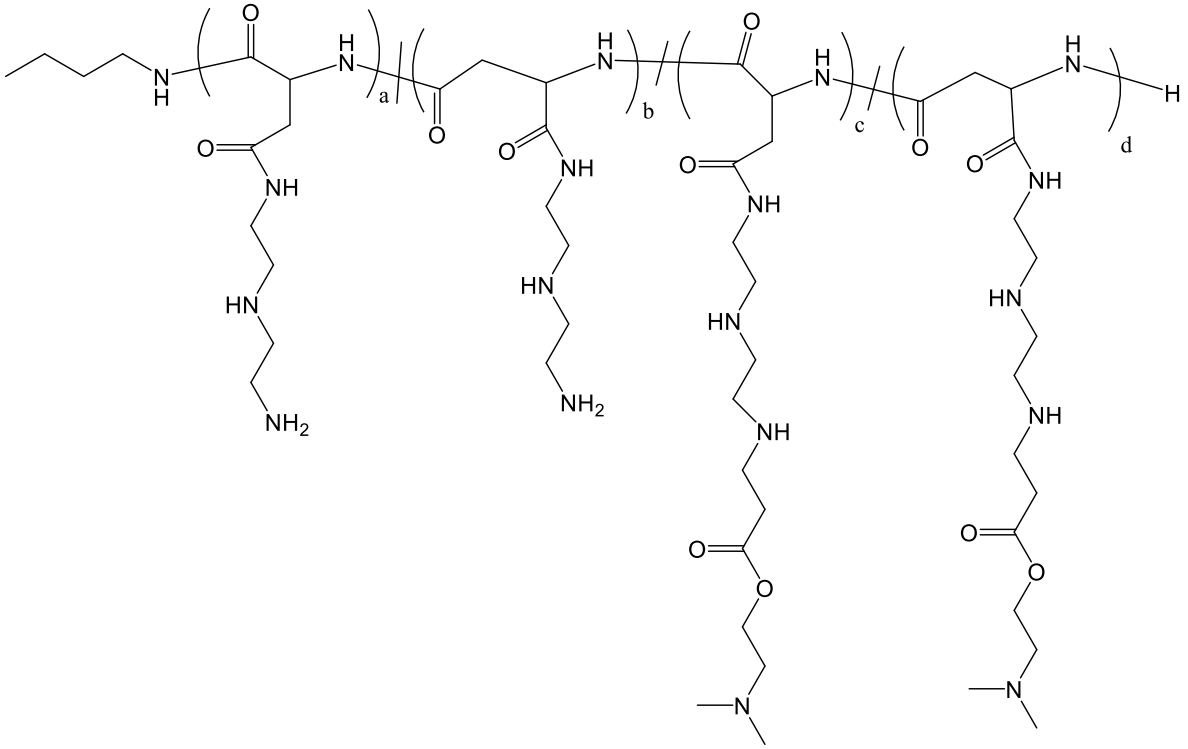


folic acid ,

wherein each of R^9, R^{10}, R^{11}, and R^{12} is independently hydrogen, halogen, C_1-C_4 alkyl, or C_1-C_4 alkoxy, optionally substituted with one or more amino groups.

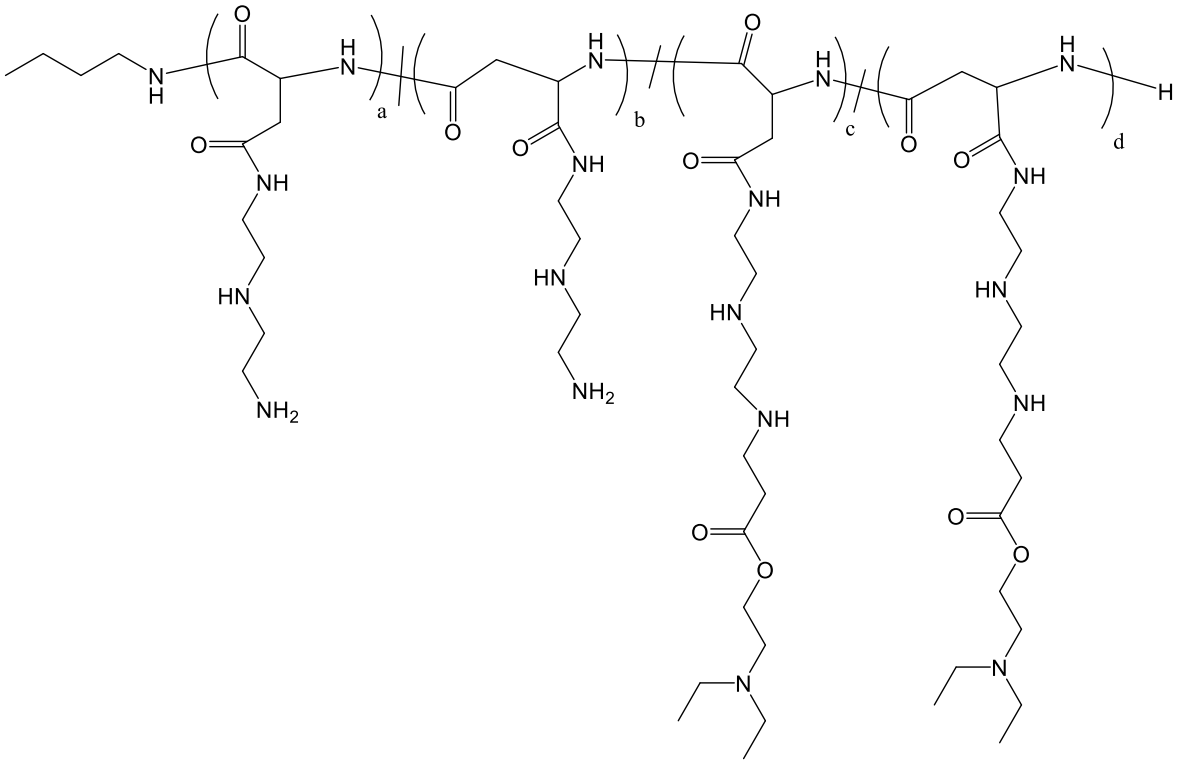
10. The polymer of any of claims 1-9, wherein the polymer is a cationic polymer.

11. The polymer of claim 1 having the formula:



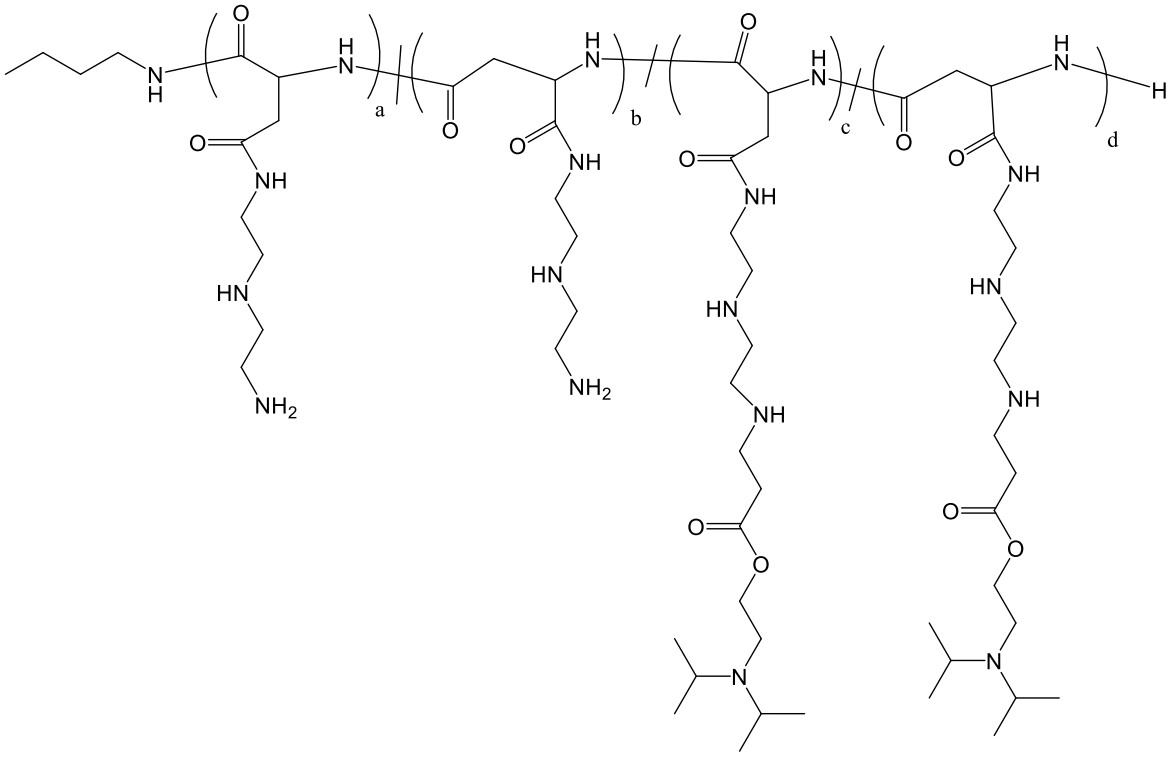
Polymer 1

,



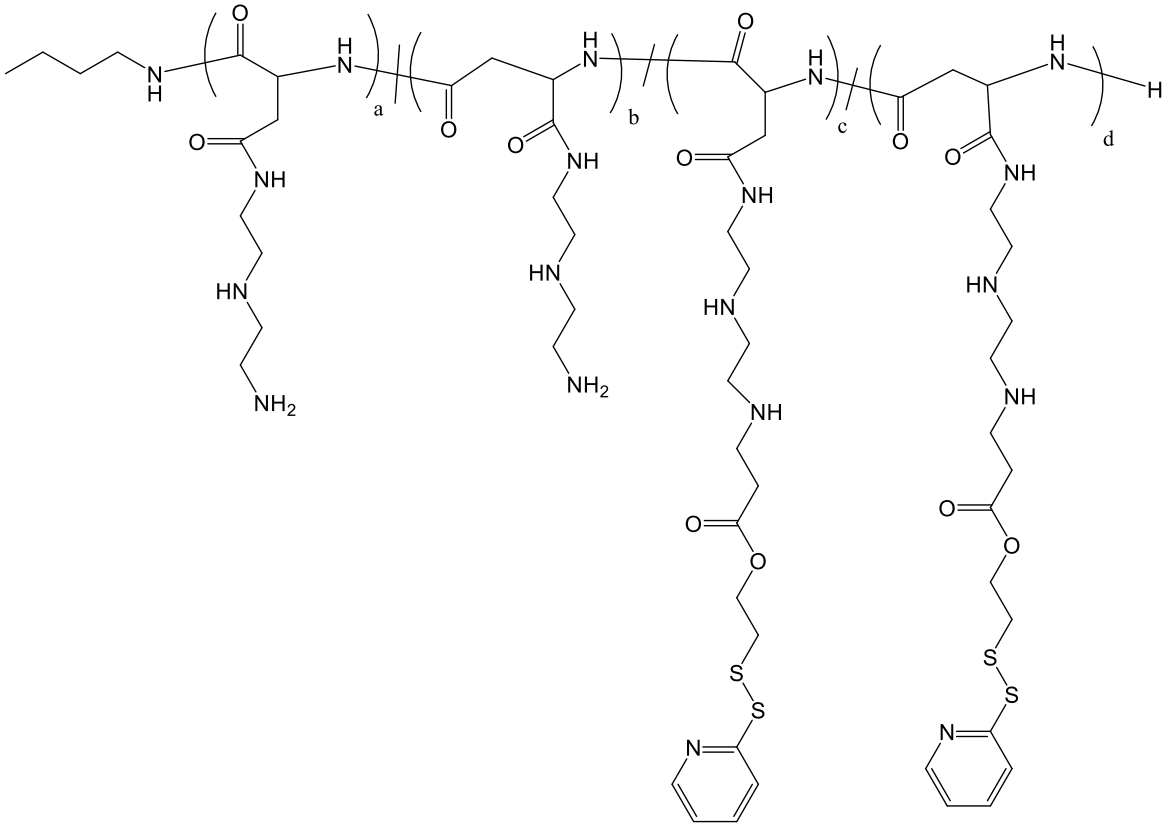
Polymer 2

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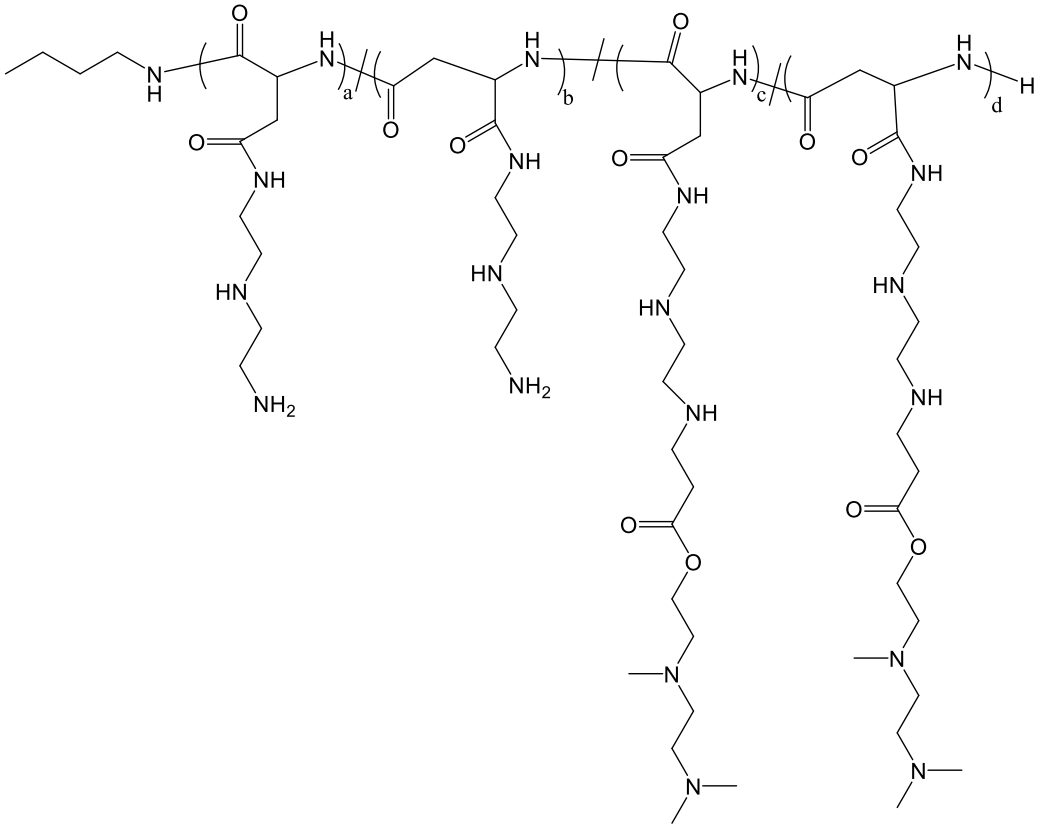
Polymer 3

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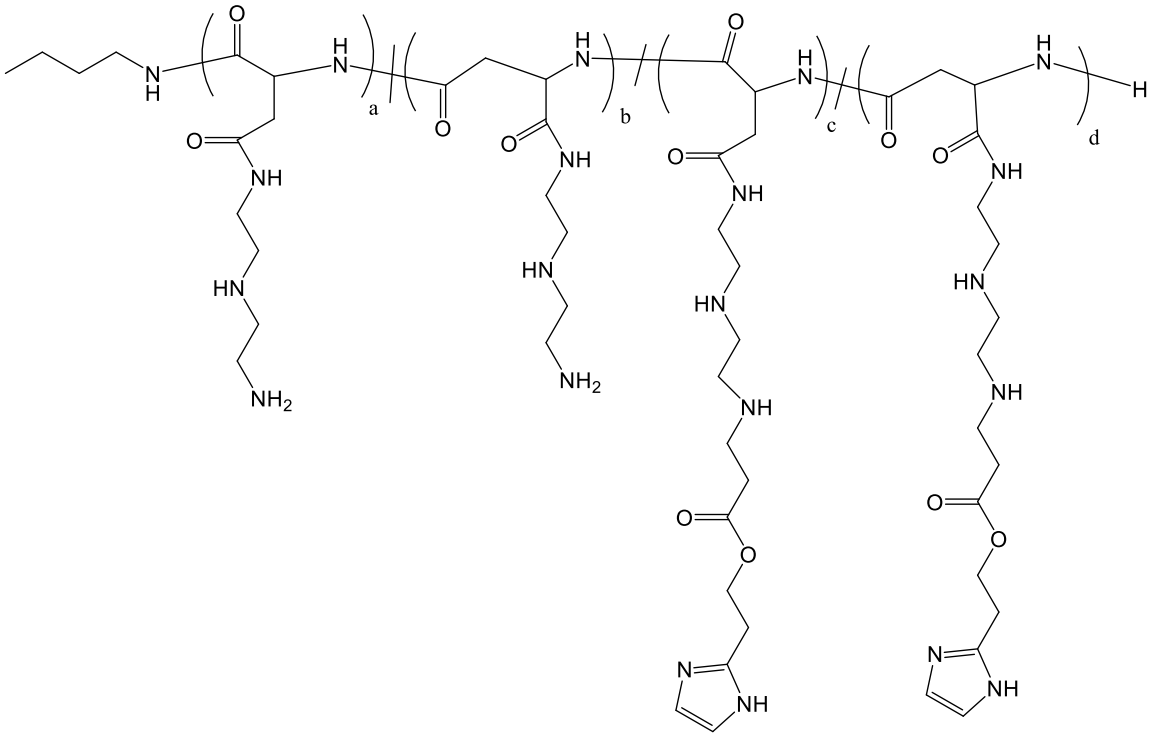
Polymer 4

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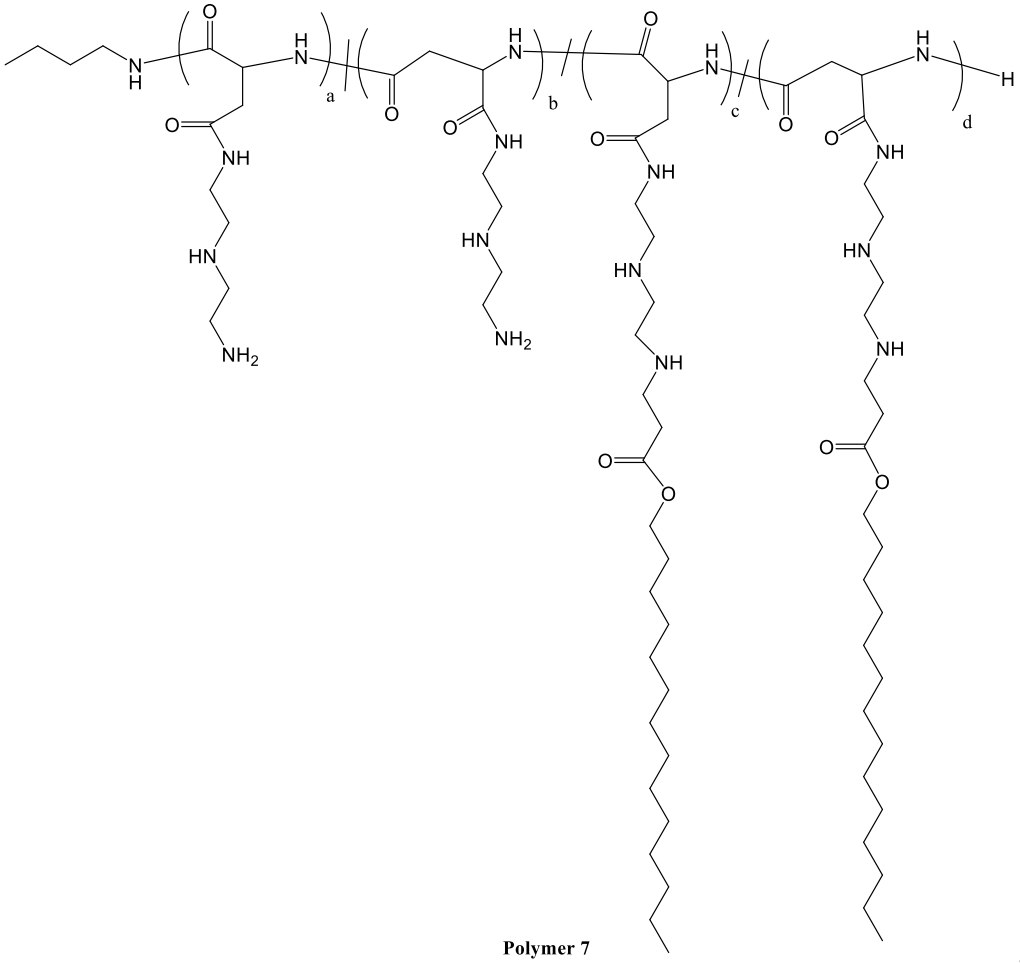
Polymer 5

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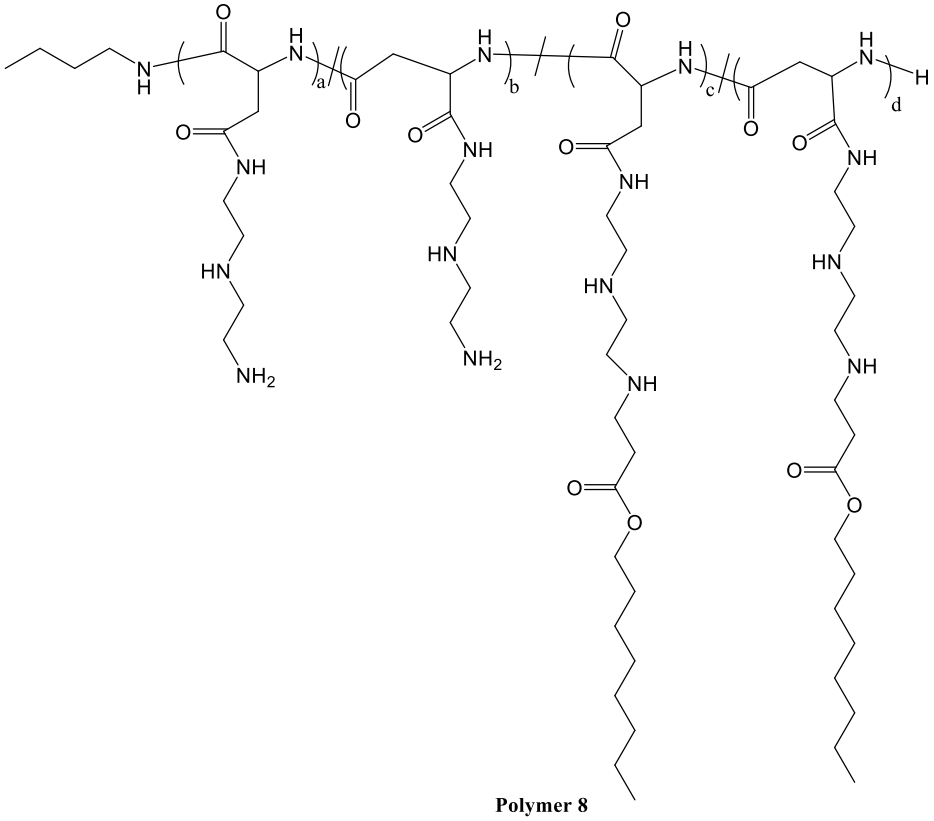
Polymer 6

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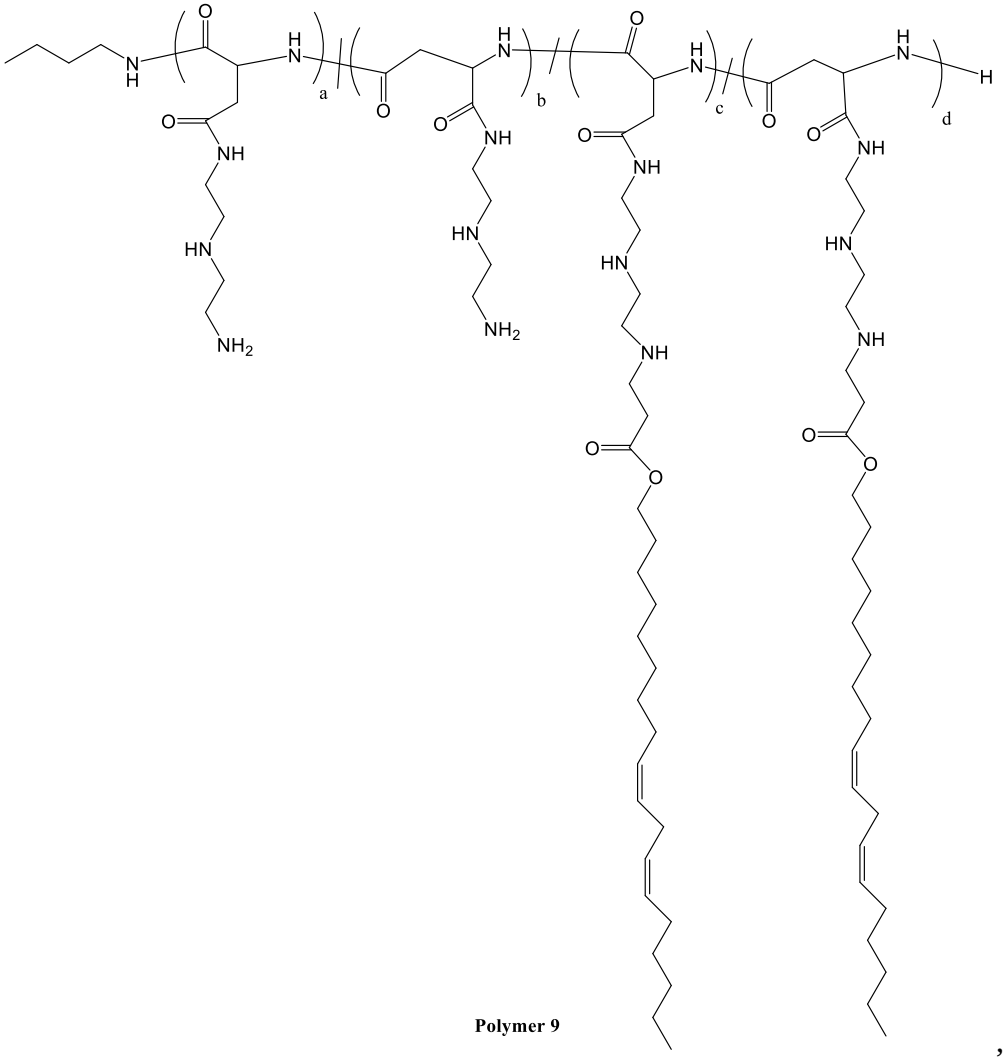
Polymer 7

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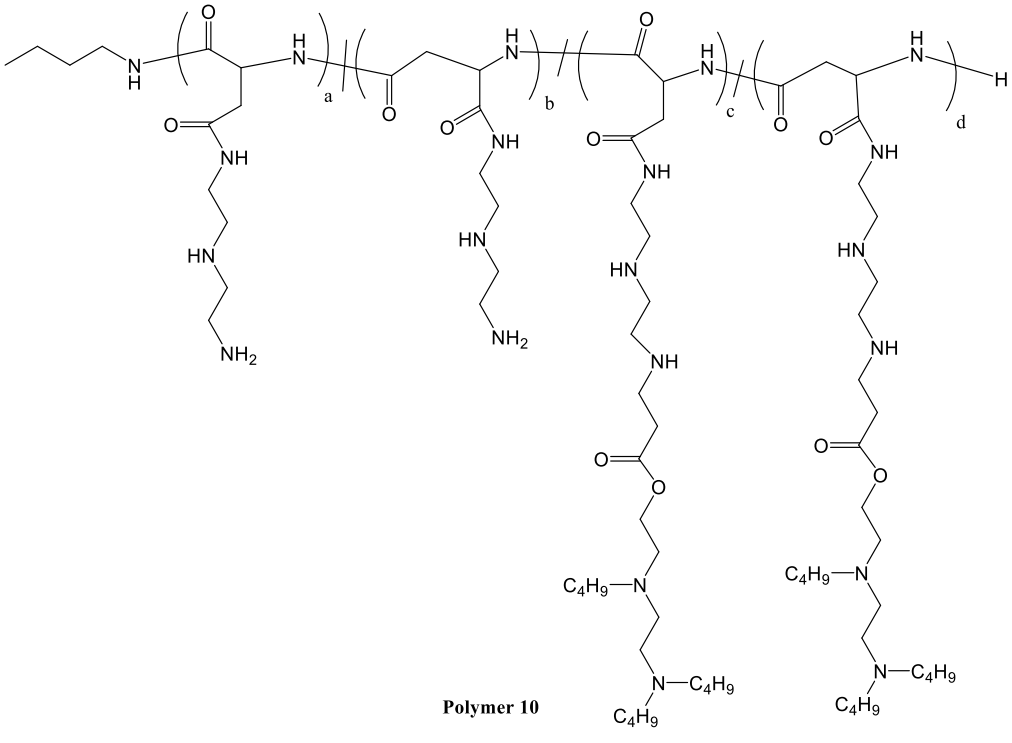
Polymer 8

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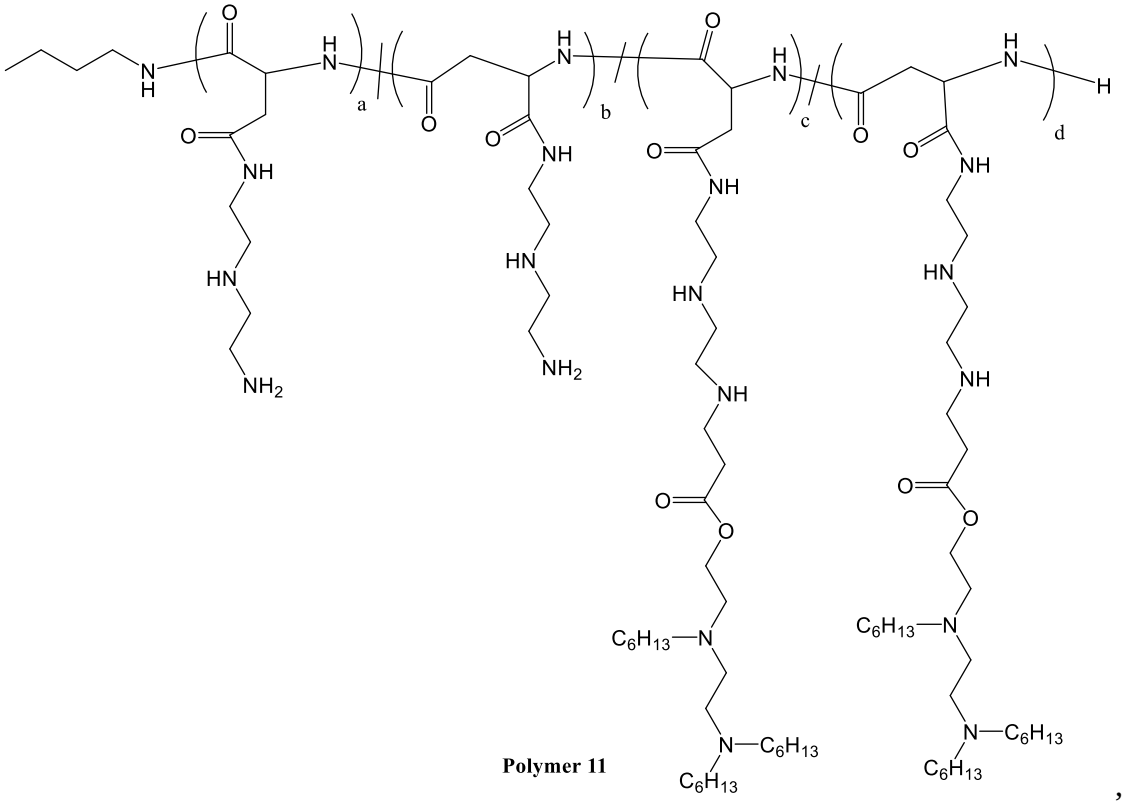
Polymer 9

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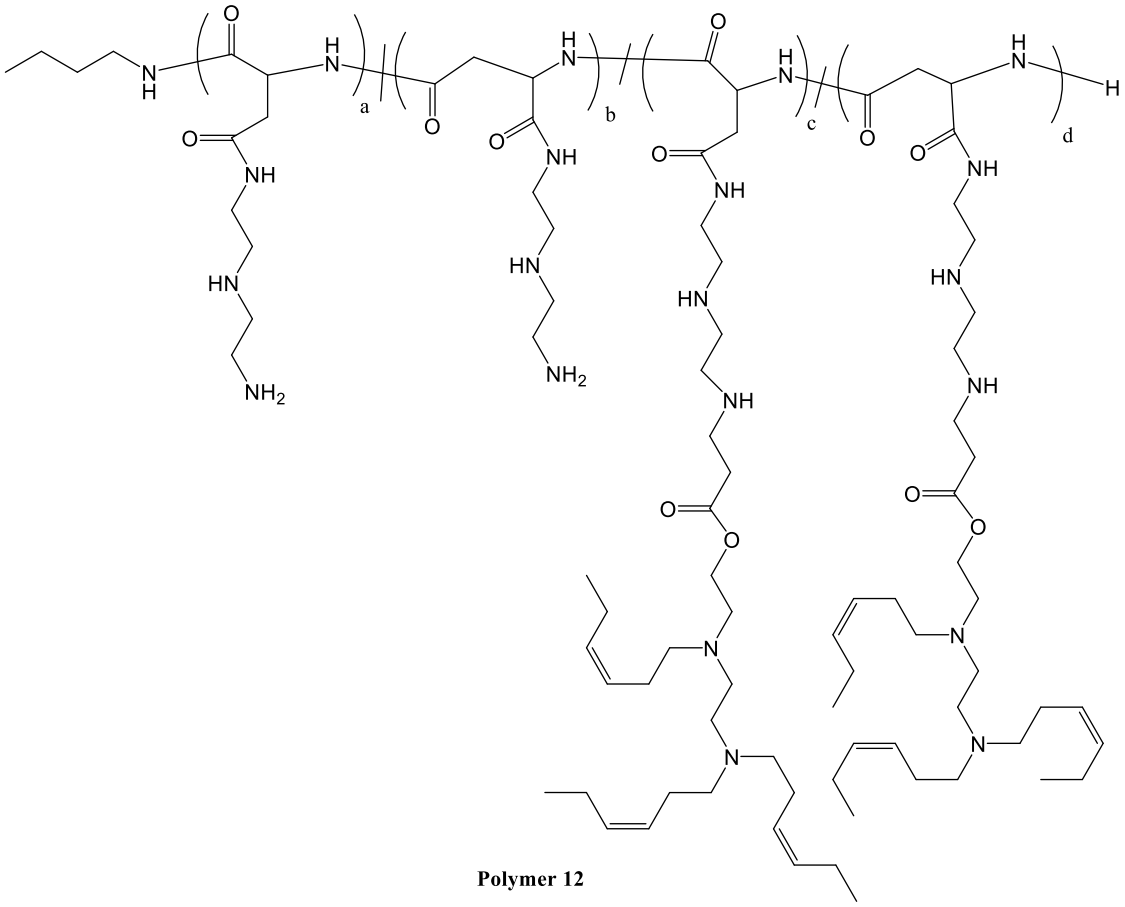
Polymer 10

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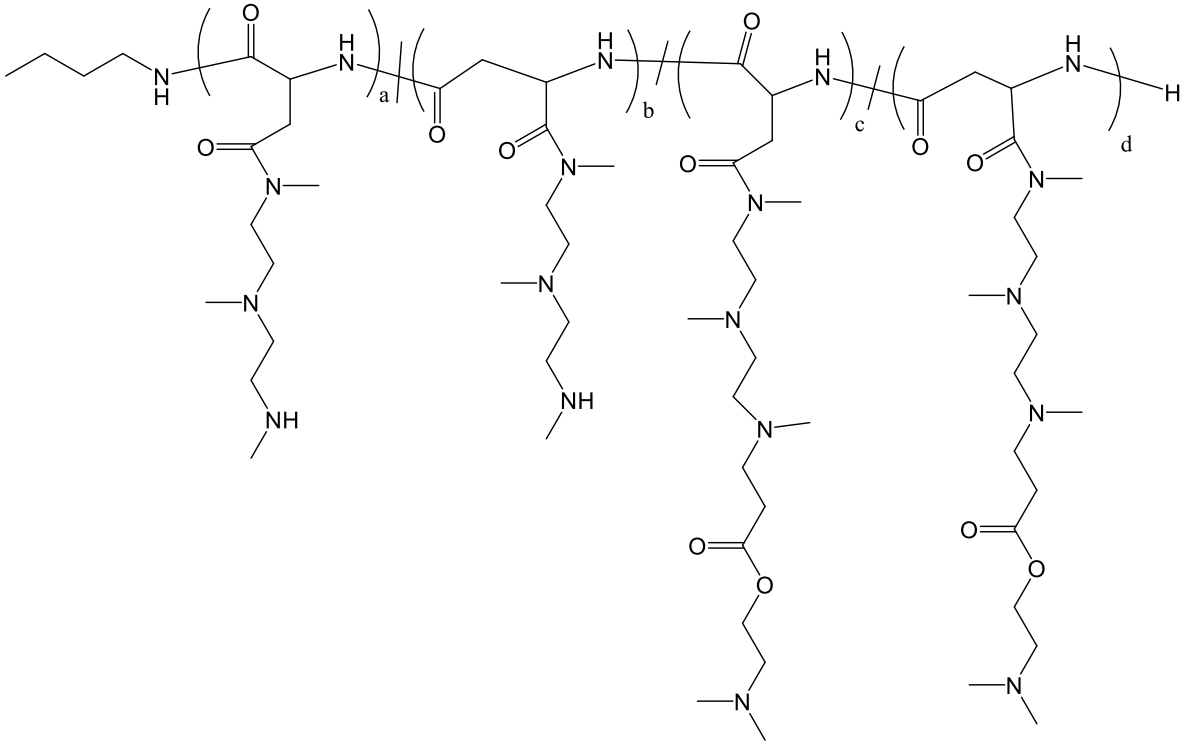
Polymer 11

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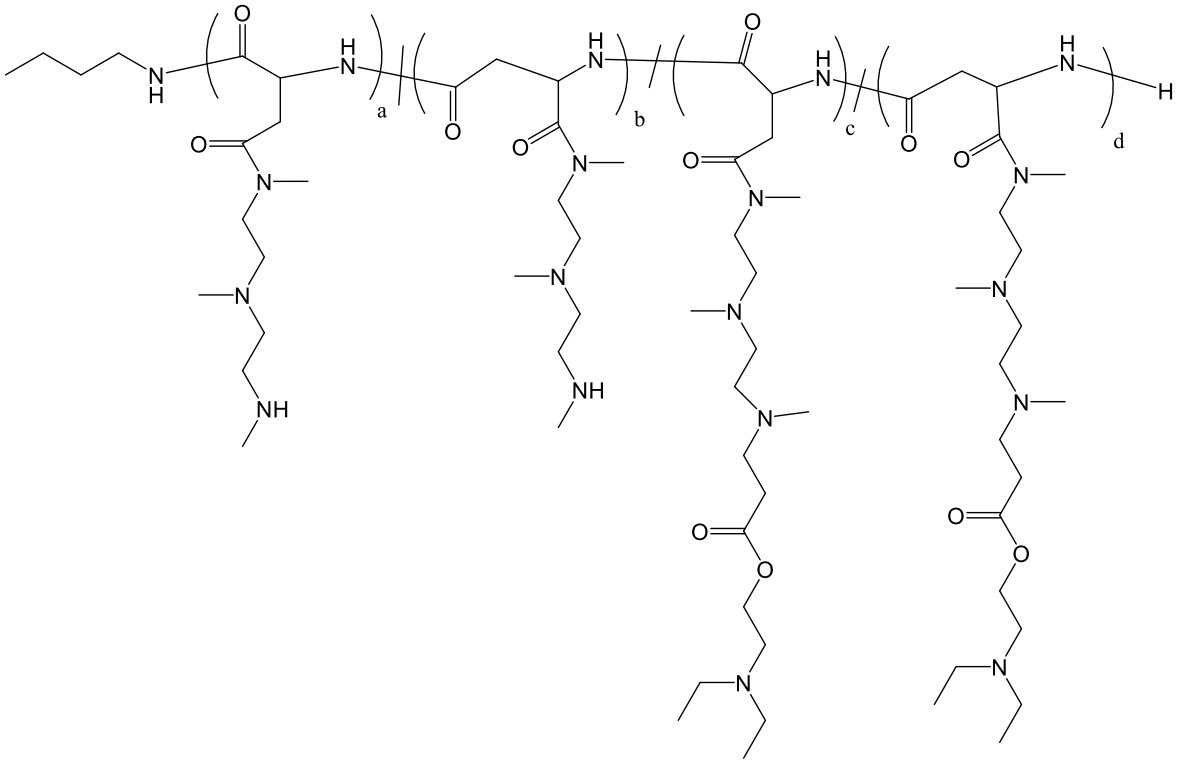
Polymer 12

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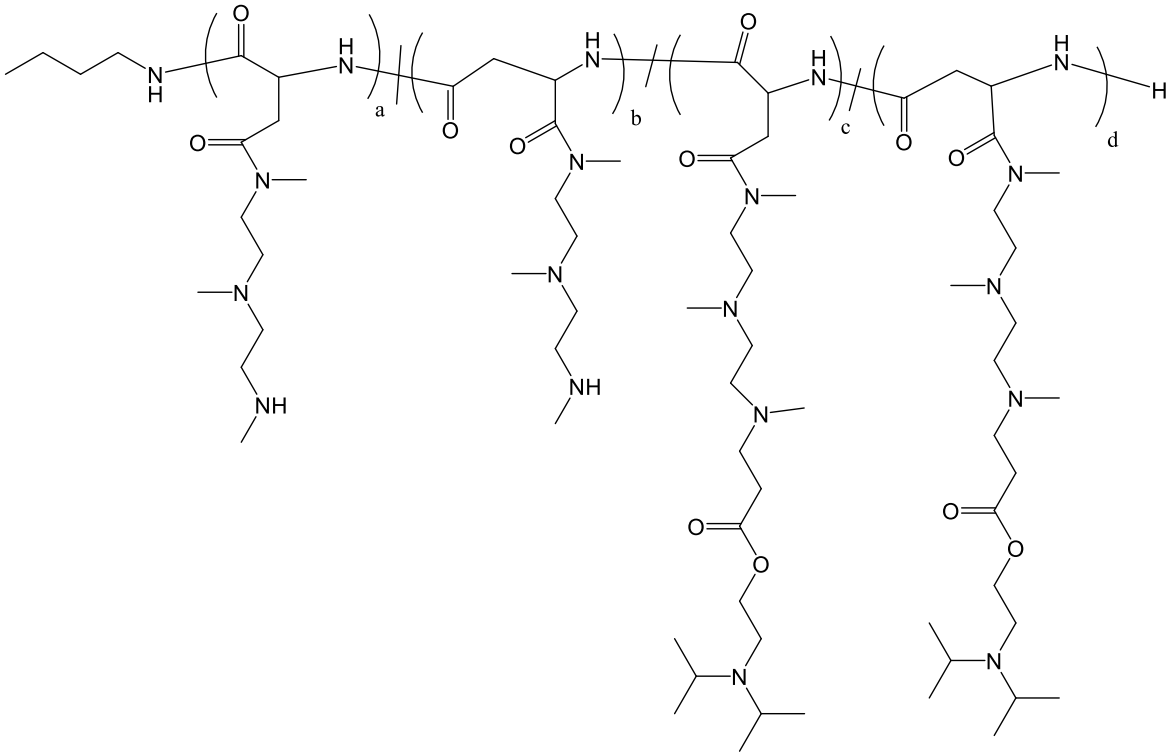
Polymer 13

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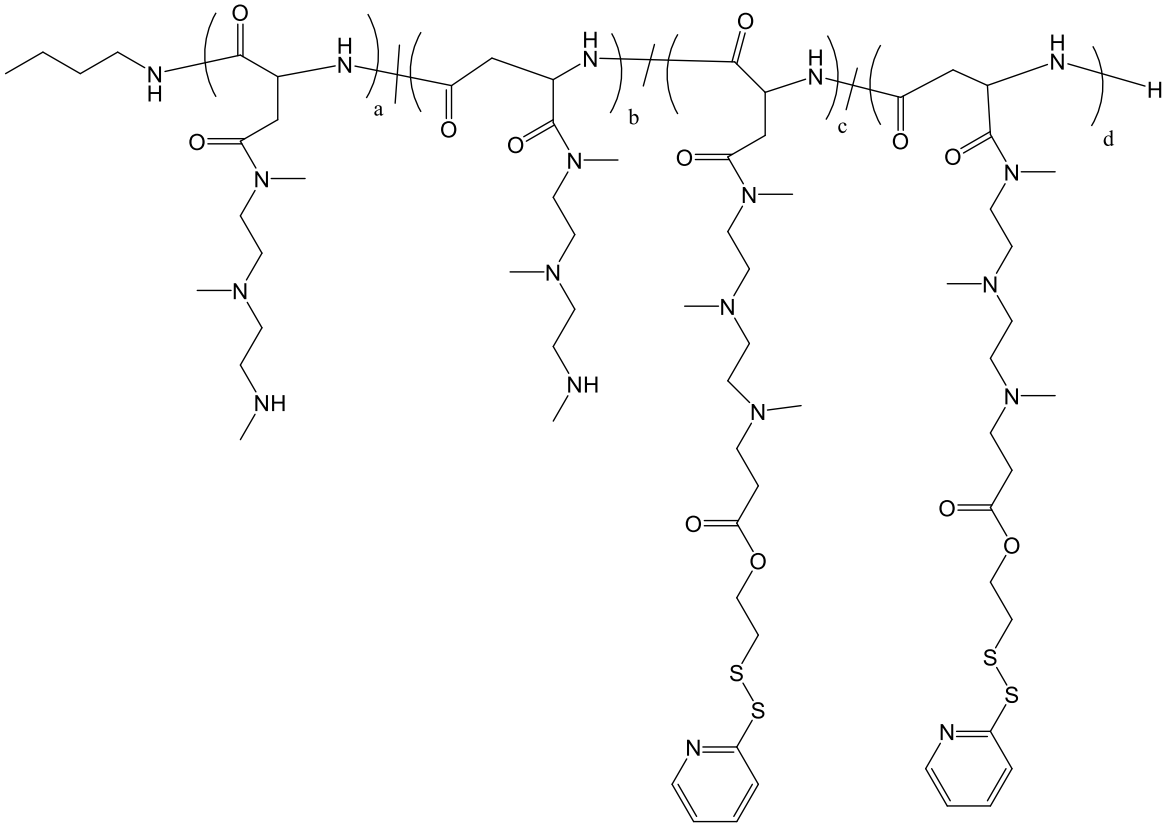
Polymer 14

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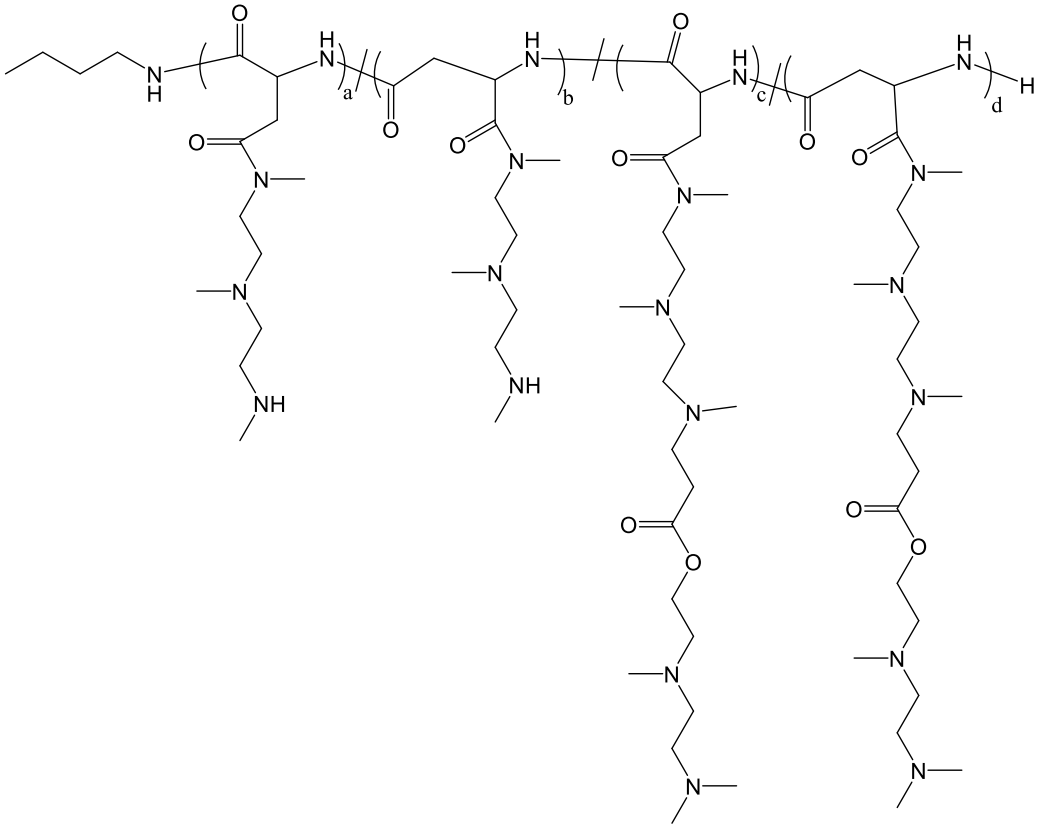
Polymer 15

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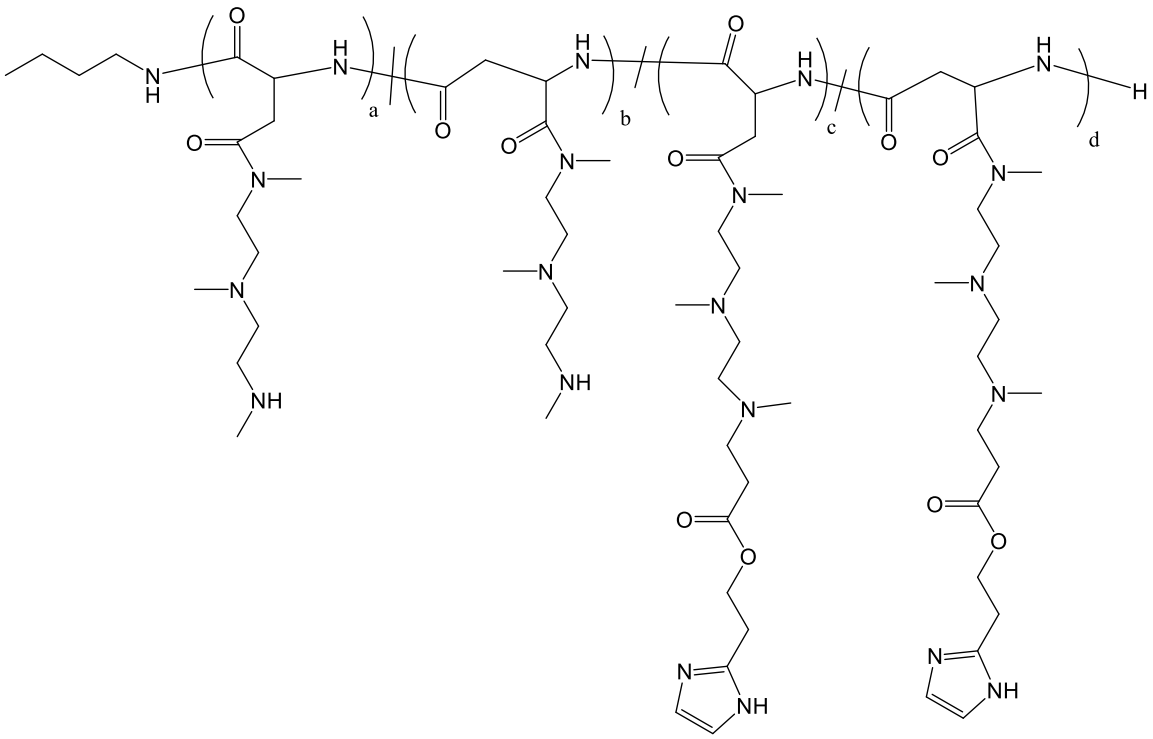
Polymer 16

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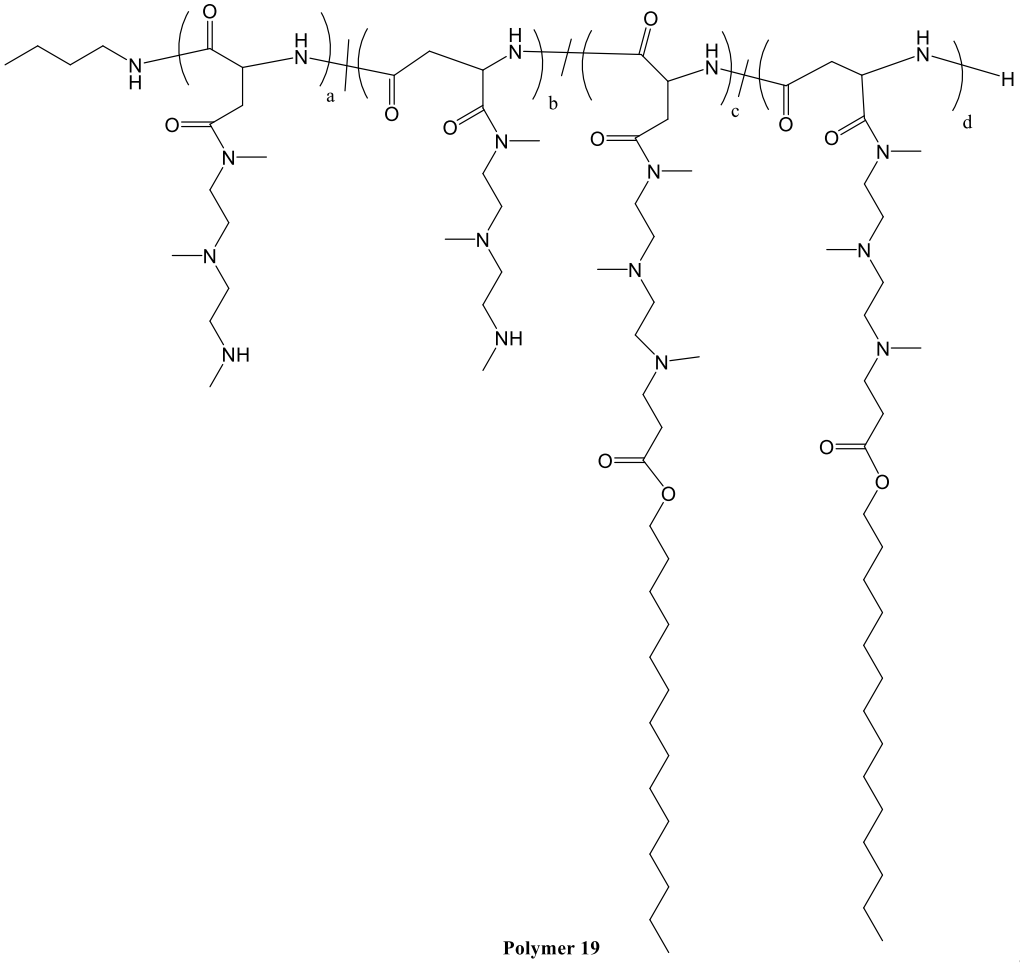
Polymer 17

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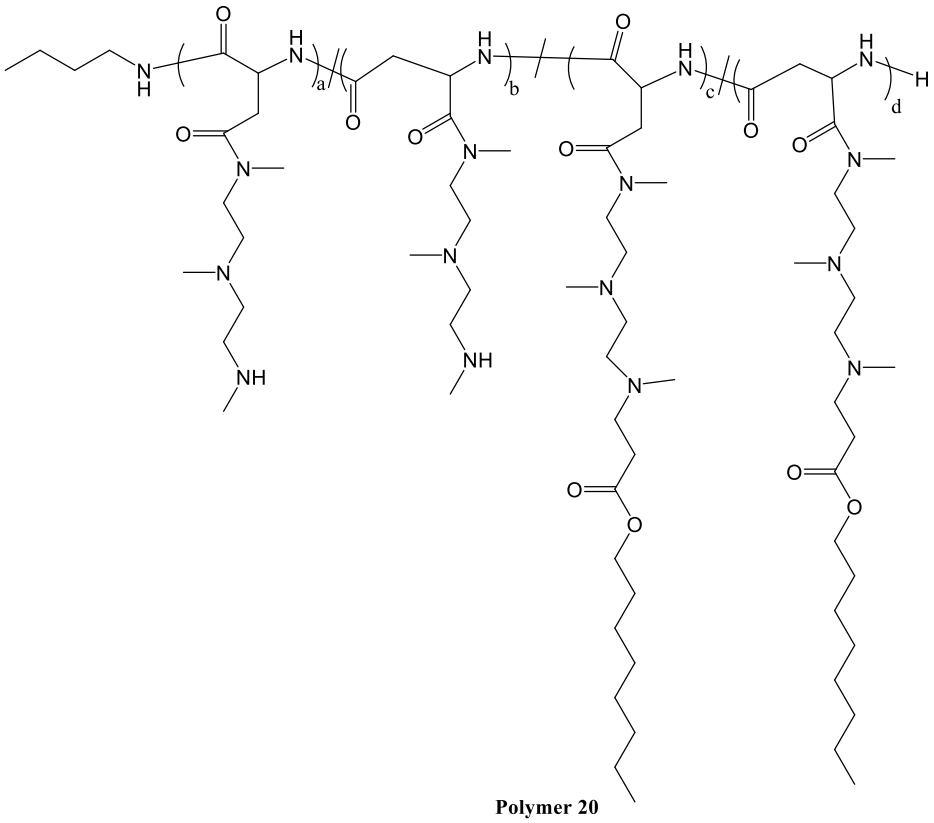
Polymer 18

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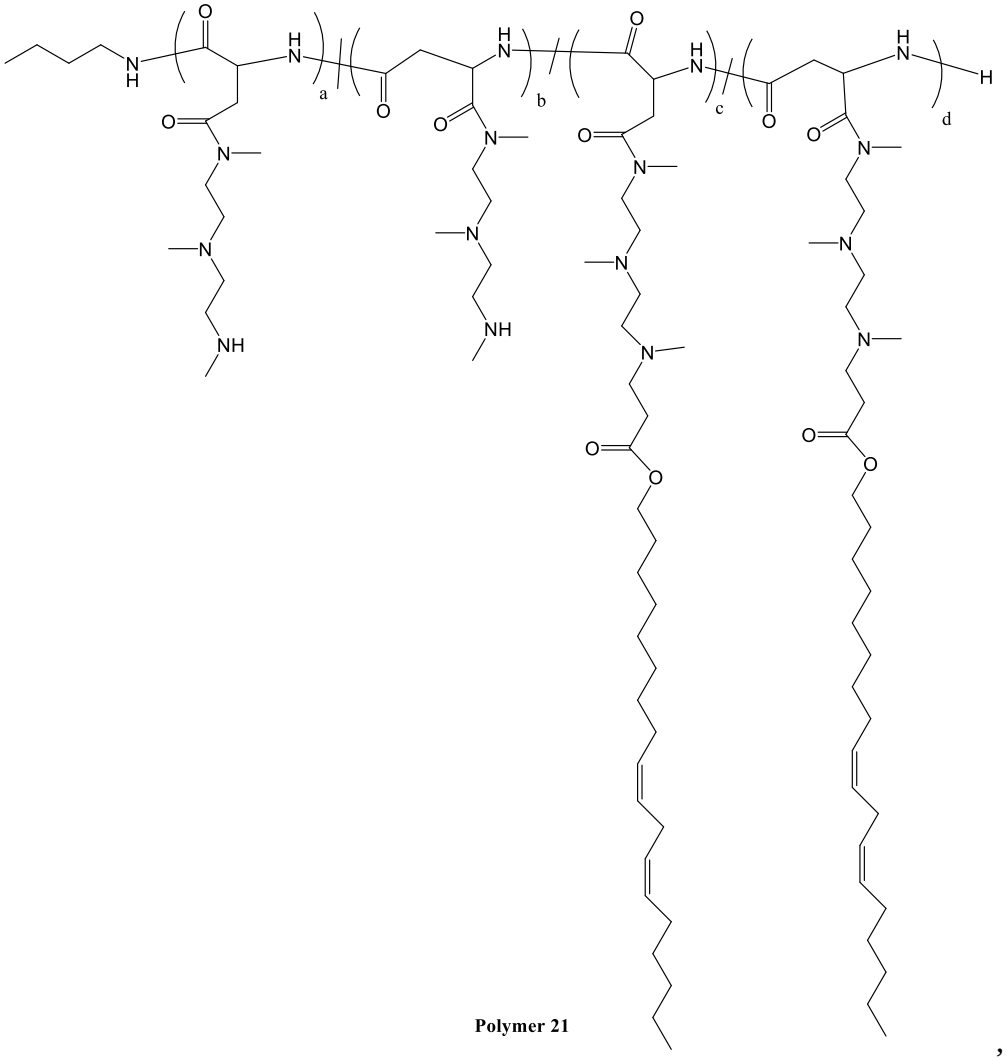
Polymer 19

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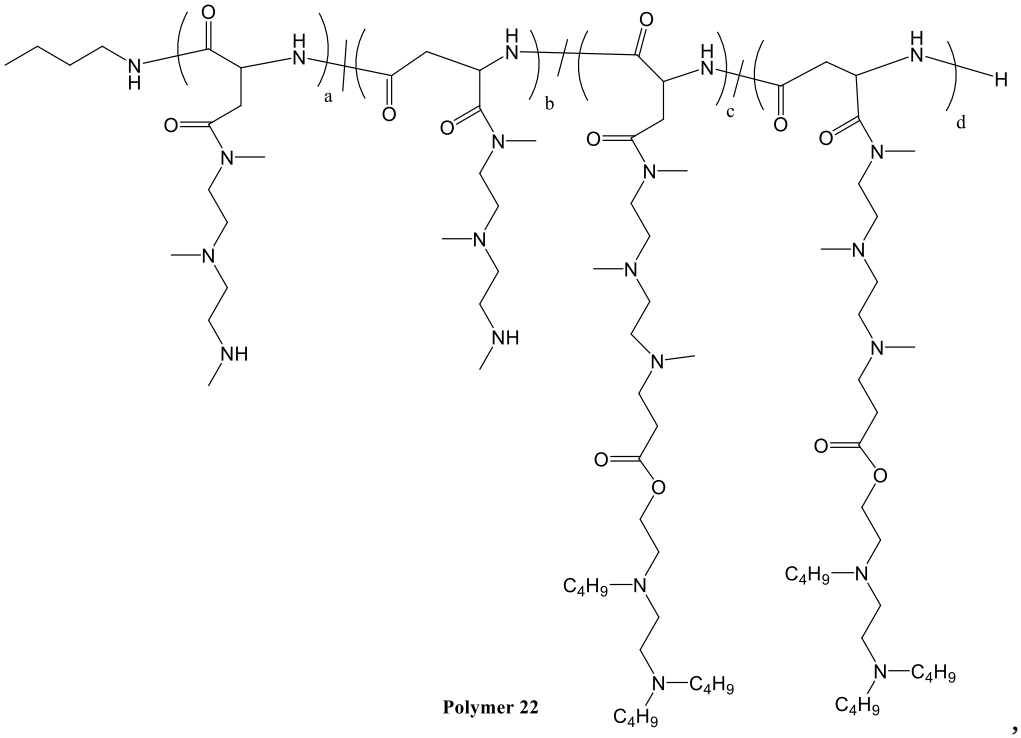
Polymer 20

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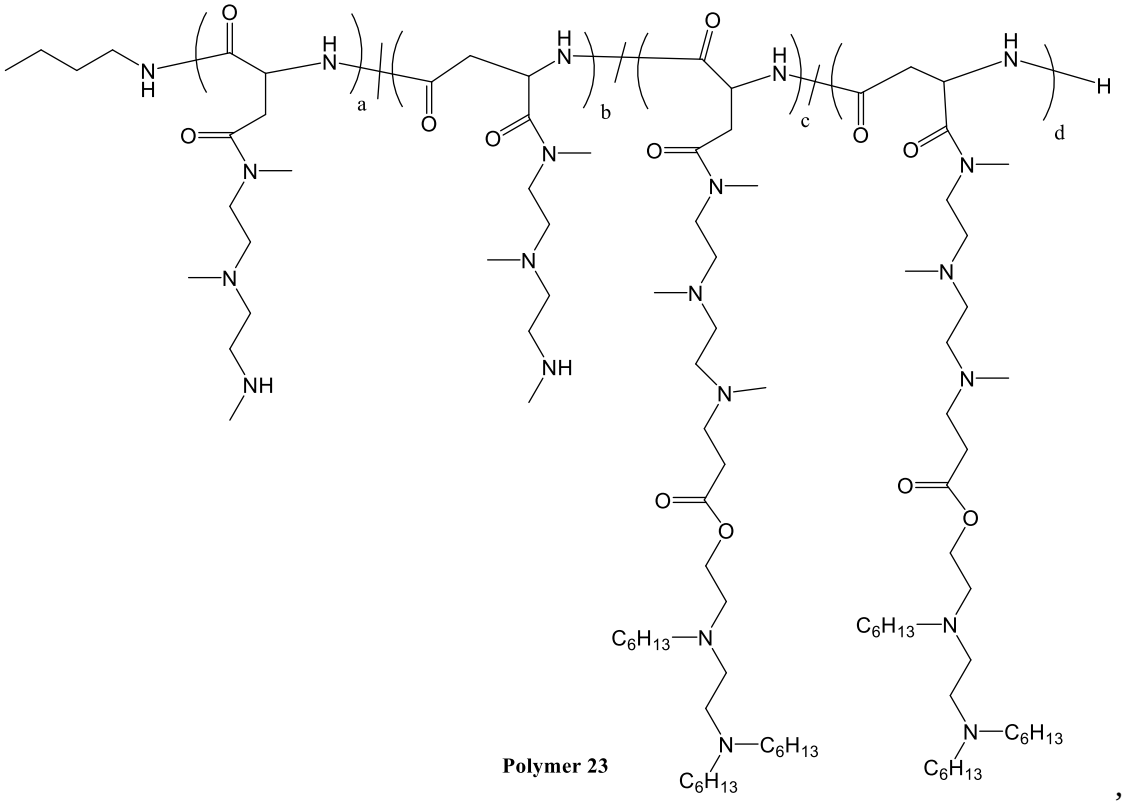
Polymer 21

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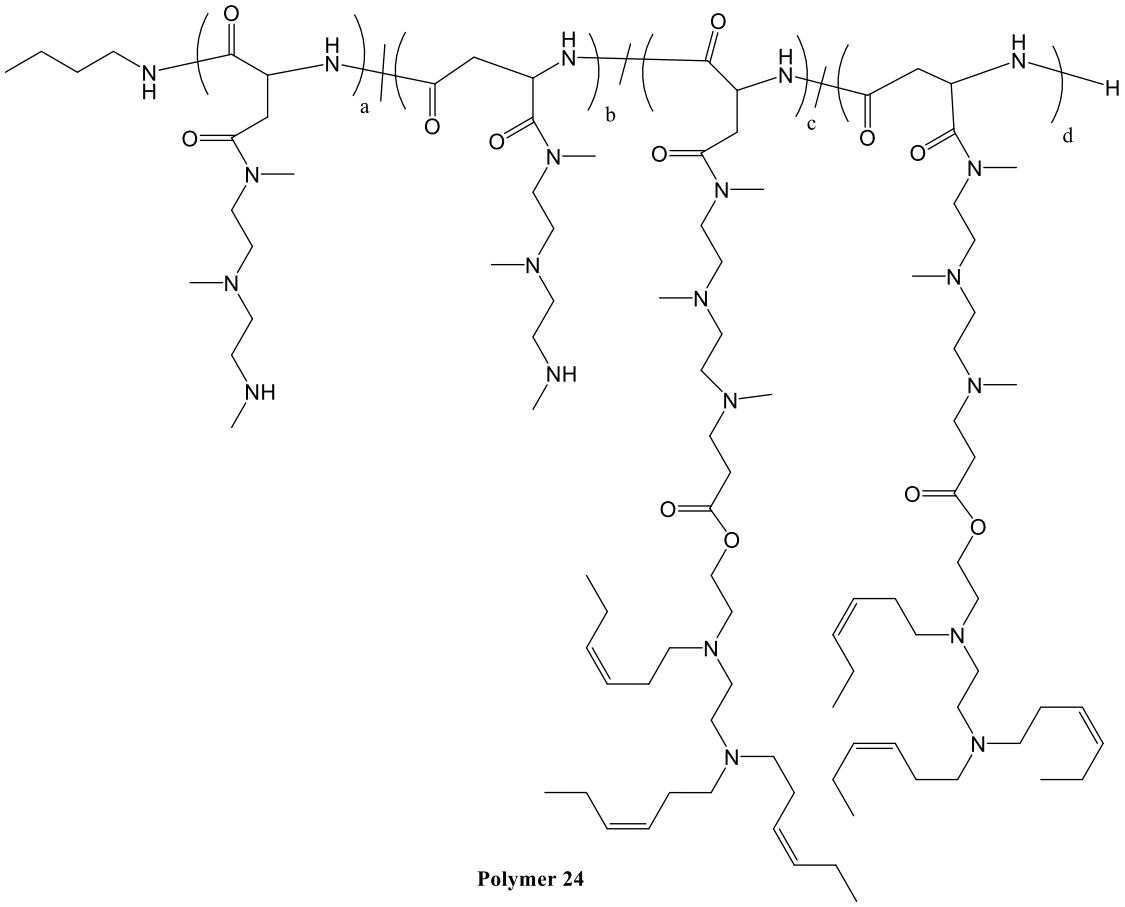
Polymer 22

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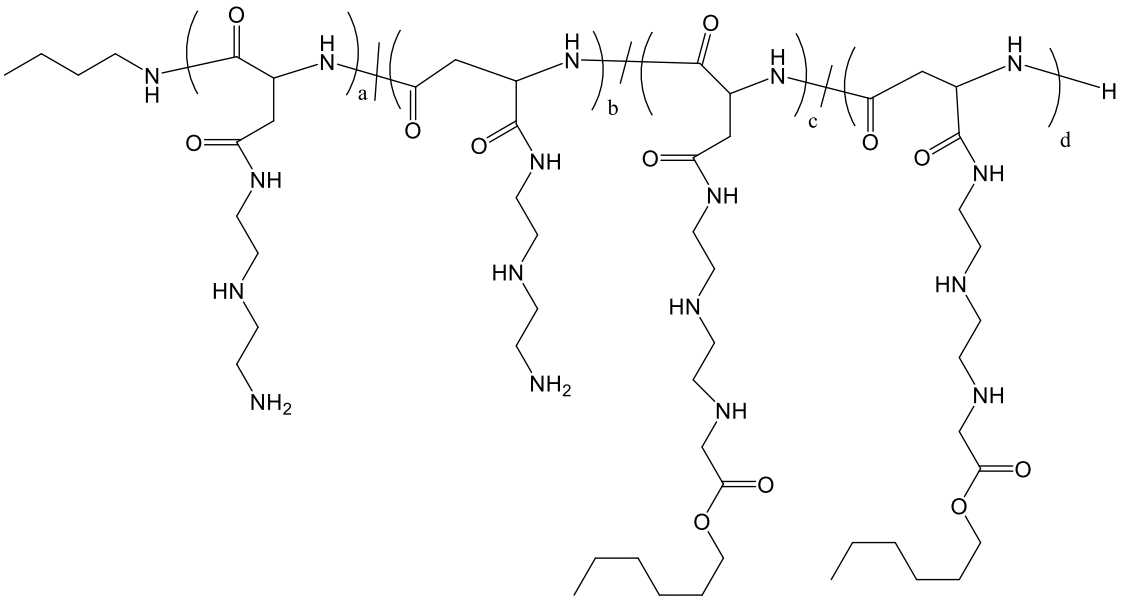
Polymer 23

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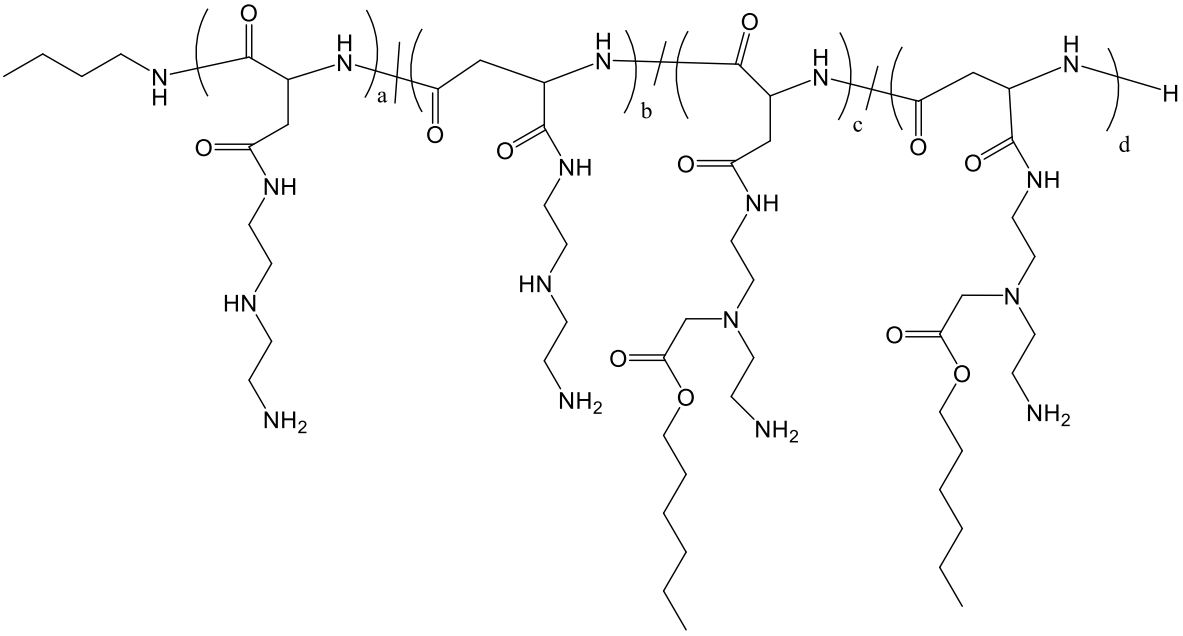
Polymer 24

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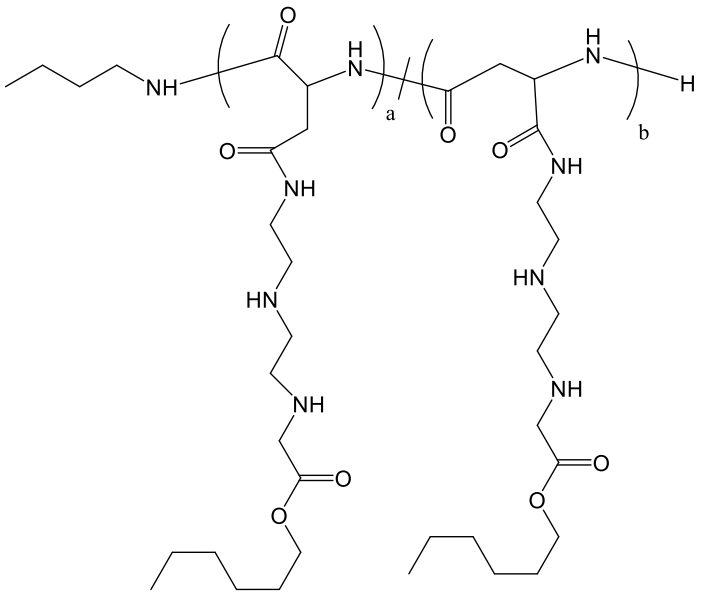
Polymer 28

, or



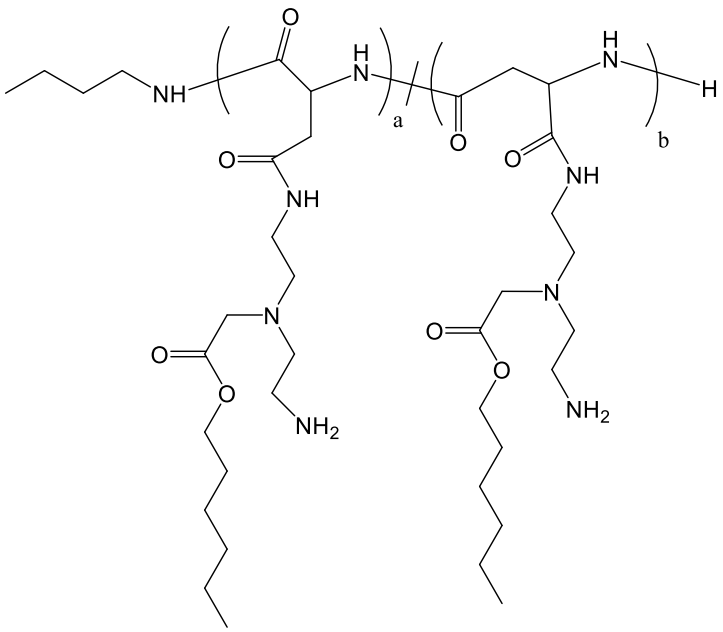
Polymer 29

,wherein (a+b) is from about 0 to about 75 and (c+d) is from about 5 to about 80, or



Polymer 37

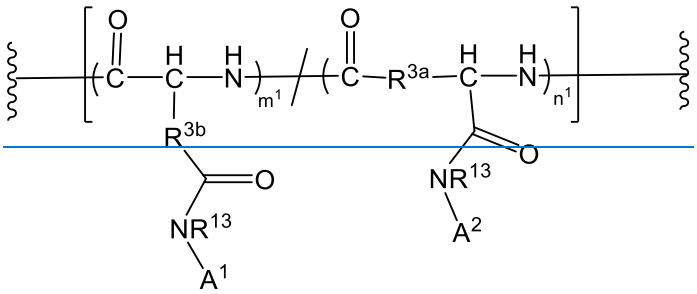
, or



Polymer 38

wherein (a+b) is from about 5 to about 160.

~~12. A polymer comprising a structure of Formula 4:~~



wherein,

each of m^1 and n^1 is an integer from 0 to 1000; provided that the sum of $m^1 + n^1$ is greater than 2;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

A^1 and A^2 are each independently a group of formula

$-(CH_2)_{p1}-[NR^2-(CH_2)_{q1}-]_{r1}NR^2{}_2$;

$-(CH_2)_{p2}-N[-(CH_2)_{q2}-NR^2{}_2]_2$;

$-(CH_2)_{p3}-N\{[-(CH_2)_{q3}-NR^2{}_2][-(CH_2)_{q4}-NR^2-]_{r2}R^2\}$; or

$-(CH_2)_{p4}-N\{-(CH_2)_{q5}-N[-(CH_2)_{q6}-NR^2{}_2]_2\}_2$,

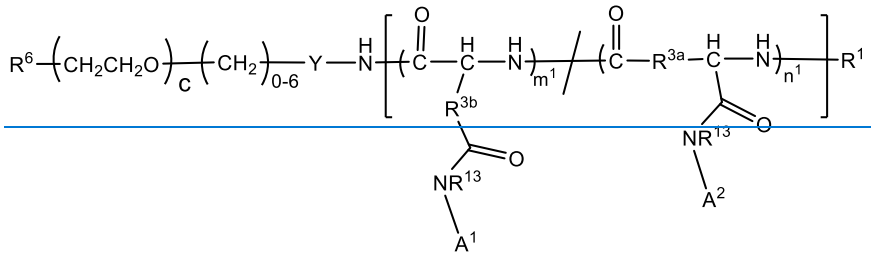
wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5;

each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, provided that A^1 and A^2 each comprise at least one tertiary amine;

R^{3a} and R^{3b} are each independently a methylene or ethylene group; and

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group.

13. The polymer of claim 12, having the structure of Formula 4A:



wherein,

c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker;

each of m^1 and n^1 is an integer from 0 to 1000; provided that the sum of $m^1 + n^1$ is greater than 2;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

A^1 and A^2 are each independently a group of formula

$-(CH_2)_{p1}-[NR^2-(CH_2)_{q1}-]_{r1}NR^2{}_2$;

$-(CH_2)_{p2}-N[-(CH_2)_{q2}-NR^2{}_2]_2$;

$-(CH_2)_{p3}-N\{[-(CH_2)_{q3}-NR^2{}_2][-(CH_2)_{q4}-NR^2-]_{r2}R^2\}$; or

$-(CH_2)_{p4}-N\{-(CH_2)_{q5}-N[-(CH_2)_{q6}-NR^2{}_2]_2\}_2$,

wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5; and each instance of R^2 is independently a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group.

R^1 is hydrogen, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, or a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more substituents;

each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, provided that A^1 and A^2 each comprise at least one tertiary amine;

R^{3a} and R^{3a} are each independently a methylene or ethylene group;

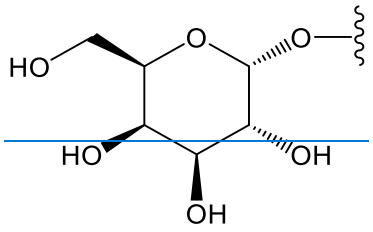
R^6 is hydrogen, an amino group, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more amines; or a tissue-specific or cell-specific targeting moiety; and

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group.

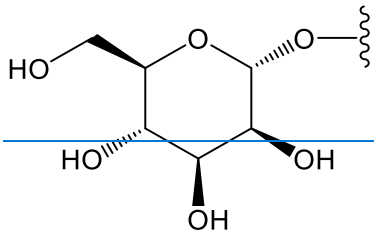
14. The polymer of claim 12 or 13, wherein each of A^1 and A^2 is a group of formula $-(CH_2)_2-NR^2-(CH_2)_2-NR^2{}_2$, wherein each instance of R^2 is independently a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, with the exception that then terminal amine is a primary, secondary, or tertiary amine.

15. The polymer of claim 14, wherein each instance of R^2 is methyl.

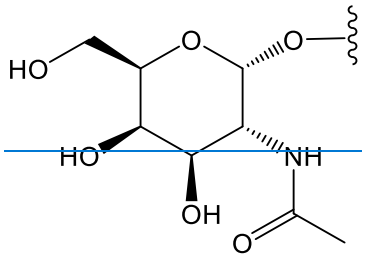
~~16. The polymer of any one of claims 13-15, wherein the tissue-specific or cell-specific targeting moiety is:~~



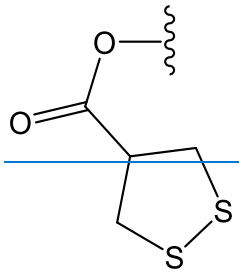
alpha-d-galactose ~~;~~



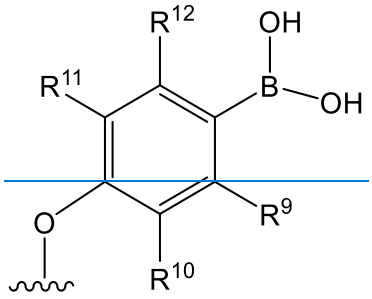
alpha-d-mannose ~~;~~



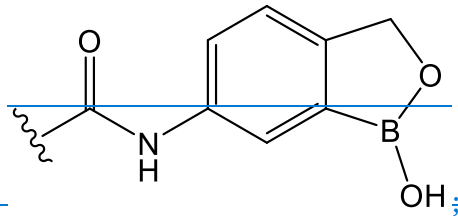
N-acetylgalactosamine ~~;~~



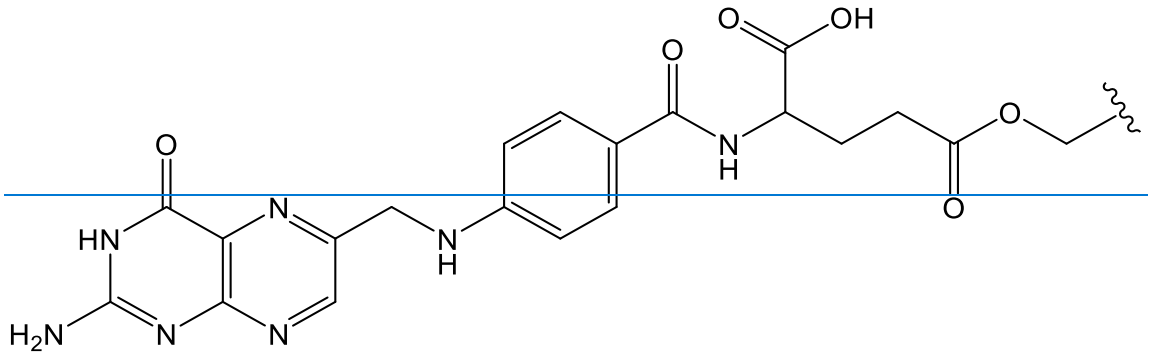
Asparagusic acid ~~;~~



Phenylboronic acid ~~;~~



~~; or~~

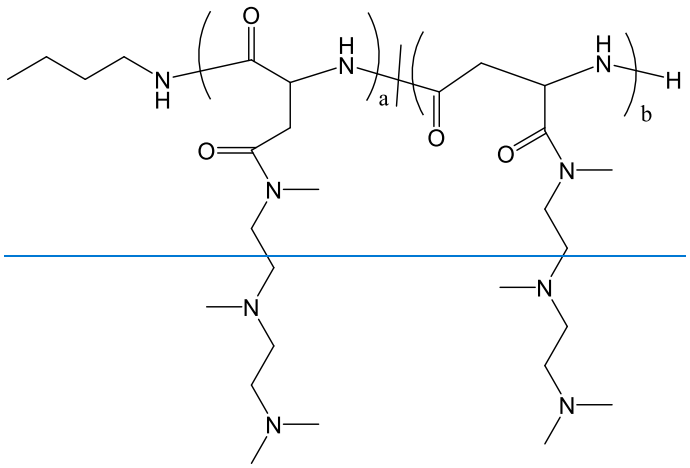


folic acid ~~;~~

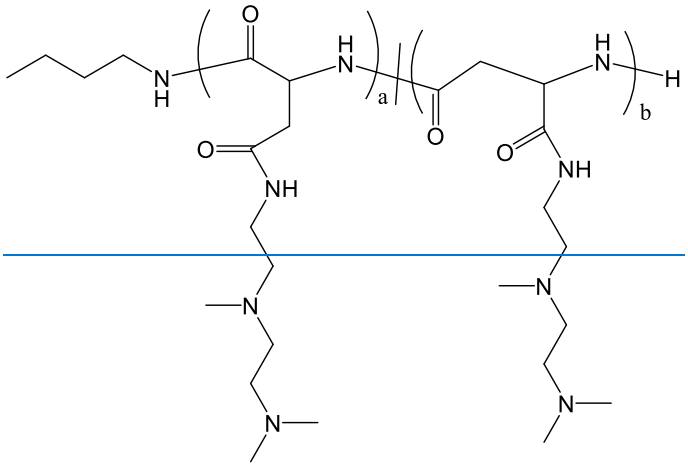
~~wherein each of R^9, R^{10}, R^{11}, and R^{12} is independently hydrogen, halogen, C_1-C_4 alkyl, or C_1-C_4 alkoxy, optionally substituted with one or more amino groups.~~

~~17. The polymer of any of claims 12-16, wherein the polymer is a cationic polymer.~~

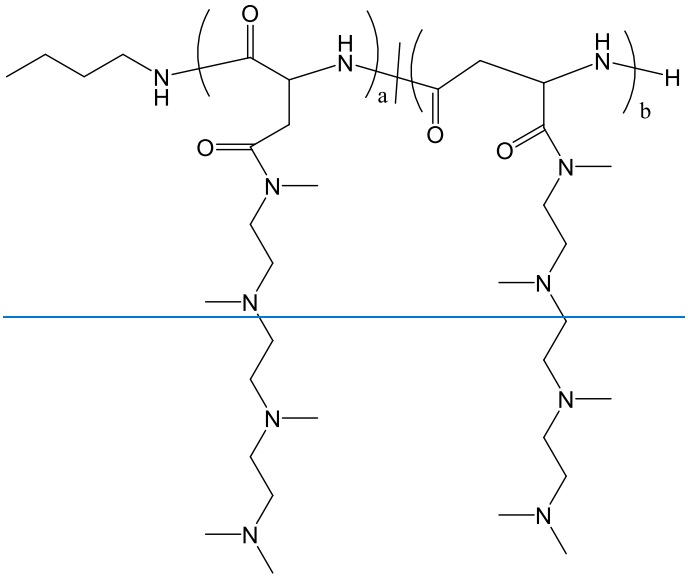
~~18. The polymer of claim 12 having the formula:~~



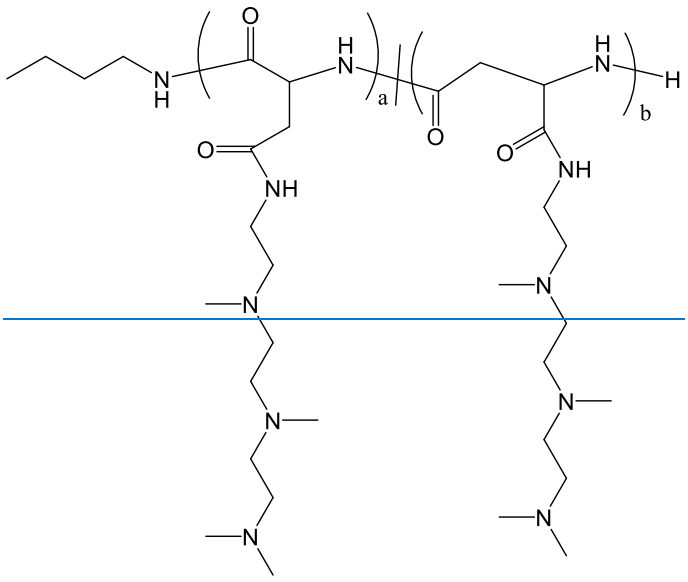
Polymer 30



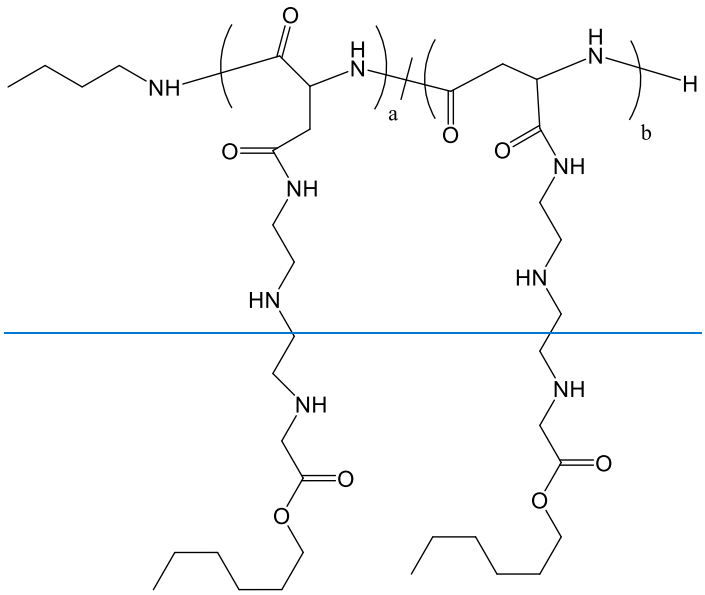
Polymer 31



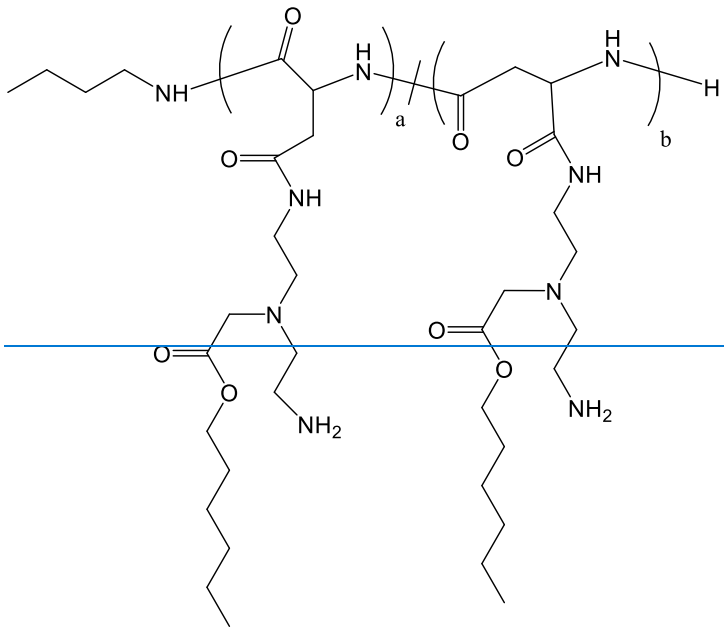
Polymer 32



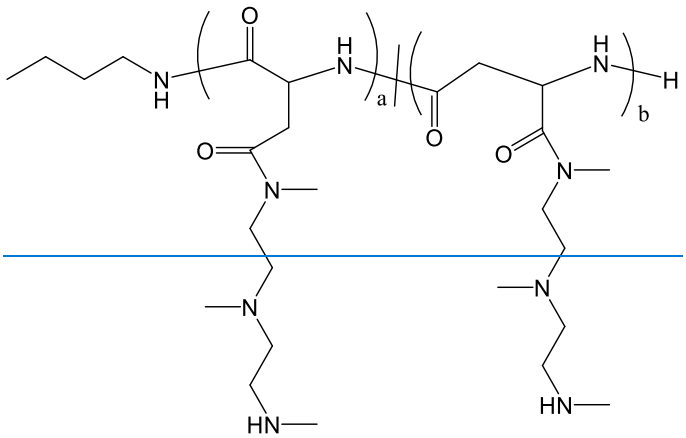
Polymer 33



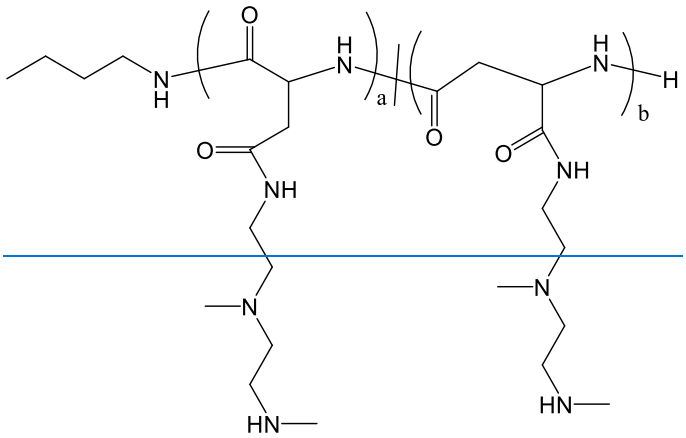
Polymer 37



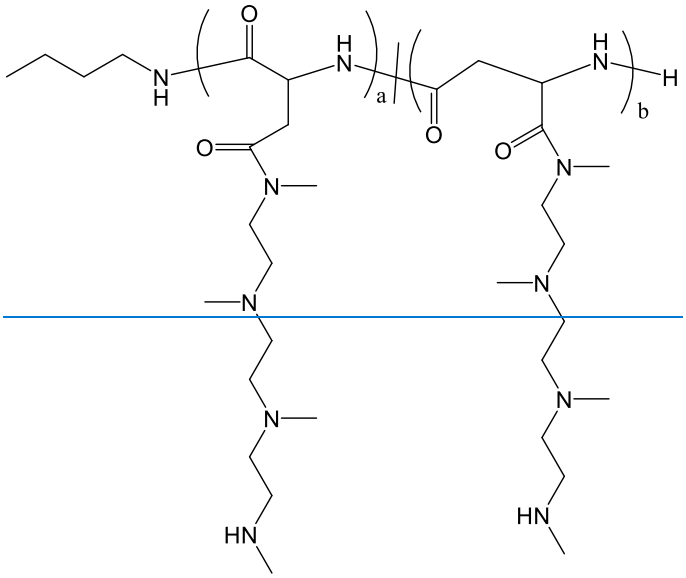
Polymer 38



Polymer 39

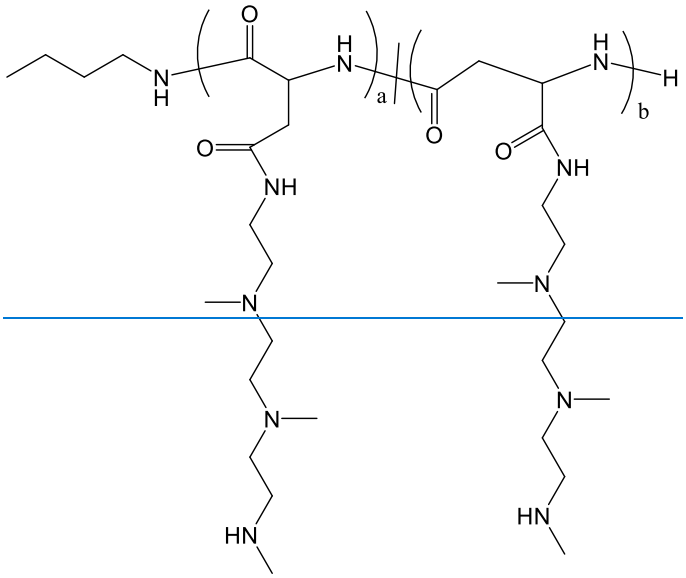


Polymer 40



Polymer 41

~~, or~~

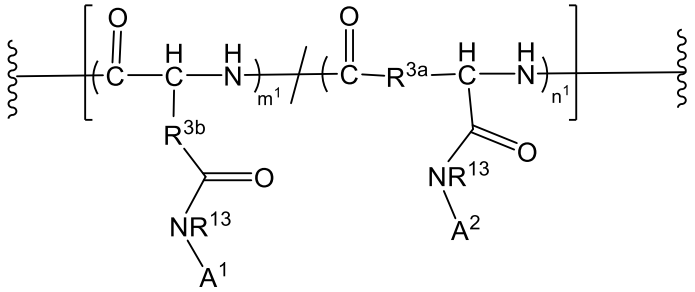


Polymer 42

,

~~wherein (a+b) is from about 5 to about 160.~~

~~19~~12. A method of preparing a polymer of any one of claims 1-11, the method comprising modifying at least a portion of groups A^1 and/or A^2 of a polymer comprising a structure of Formula 3:



wherein:

each of m^1 and n^1 is an integer from 0 to 1000, provided that $m^1 + n^1$ is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

R^{3a} and R^{3b} are each independently a methylene or ethylene group;

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

A^1 and A^2 are each independently a group of formula

—$(CH_2)_{p1}$—[NR^2—$(CH_2)_{q1}$—]$_{r1}NR^2_2$;

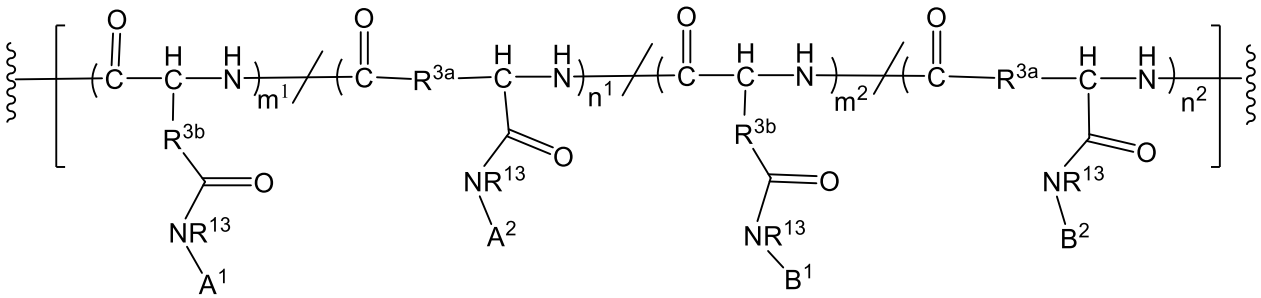
—$(CH_2)_{p2}$—N[—$(CH_2)_{q2}$—NR^2_2]$_2$;

—$(CH_2)_{p3}$—N{[—$(CH_2)_{q3}$—NR^2_2][—$(CH_2)_{q4}$—NR^2—]r_2R^2}; or

—$(CH_2)_{p4}$—N{—$(CH_2)_{q5}$—N[—$(CH_2)_{q6}$—NR^2_2]$_2$}$_2$,

wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5; and each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group,

to produce a polymer comprising a structure of Formula 1:



wherein:

each of m^1 and n^1 is an integer from 0 to 1000;

each of m^2 and n^2 is an integer from 0 to 1000, provided that the sum of $m^2 + n^2$ is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

R^{3a} and R^{3b} are each independently a methylene or ethylene group;

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

A^1 and A^2 are each independently a group of formula

$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2_2$;

$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2_2]_2$;

$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2_2][—(CH_2)_{q4}—NR^2—]_{r2}R^2\}$; or

$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2_2]_2\}_2$,

B^1 and B^2 are each independently

$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2$-$(CH_2)_{s1}$-$R^4$-$R^5$;

$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2$-$(CH_2)_{s2}$-$R^4$-$R^5]_2$;

$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2_2][—(CH_2)_{q4}—NR^2—]_{r2}(CH_2)_{s3}$-$R^4$-$R^5\}$;

$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2$-$(CH_2)_{s4}$-$R^4$-$R^5]_2\}_2$;

$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2$-$CH_2$-CHOH-$R^5$;

$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2$-$CH_2$-CHOH-$R^5]_2$;

$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2_2][—(CH_2)_{q4}—NR^2—]_{r2}$-$CH_2$-CHOH-$R^5\}$;

$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2$-$CH_2$-CHOH-$R^5]_2\}_2$;

$—(CH_2)_{p1}—[NR^2—(CH_2)_{q1}—]_{r1}NR^2$-$(CH_2)_{s1}$-$R^5$;

$—(CH_2)_{p2}—N[—(CH_2)_{q2}—NR^2$-$(CH_2)_{s2}$-$R^5]_2$;

$—(CH_2)_{p3}—N\{[—(CH_2)_{q3}—NR^2_2][—(CH_2)_{q4}—NR^2—]_{r2}(CH_2)_{s3}$-$R^5\}$;

$—(CH_2)_{p4}—N\{—(CH_2)_{q5}—N[—(CH_2)_{q6}—NR^2$-$(CH_2)_{s4}$-$R^5]_2\}_2$;

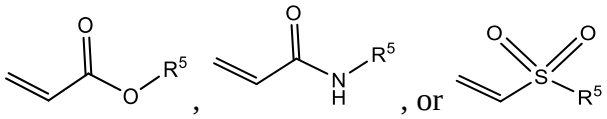
$—(CH_2)_{p1}—[N\{(CH_2)_{s1}$-$R^4$-$R^5\}—(CH_2)_{q1}—]_{r1}NR^2_2$; or

$—(CH_2)_{p1}—[N\{(CH_2)_{s1}$-$R^5\}—(CH_2)_{q1}—]_{r1}NR^2_2$,

wherein p1 to p4, q1 to q6, r1 and r2, and s1 to s4 are each independently an integer of 1 to 5; each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group; each instance of R^4 is independently -C(O)O-, -C(O)NH-, or -S(O)(O)-; and each instance of R^5 is independently an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety.

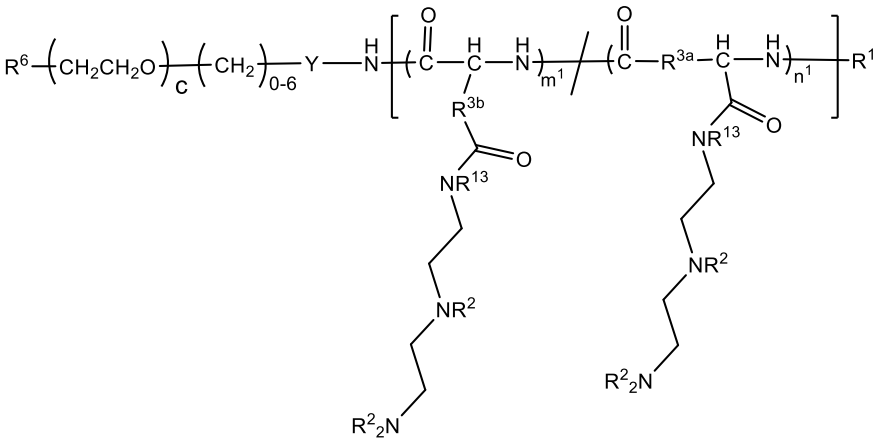
~~20~~13. The method of claim ~~19~~12, wherein group A^1 and/or A^2 of the polymer comprising a structure of Formula 3 are modified by a Michael addition reaction between the polymer comprising the structure of Formula 3 and an acrylate, an acrylamide, a vinyl sulfone, or a combination thereof.

~~21~~14. The method of claim ~~20~~13, wherein the acrylate, acrylamide, or vinyl sulfone is of the formula:



wherein R^5 is an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety.

~~22~~15. The method of any one of claims ~~19~~12-~~21~~14, wherein the polymer comprising the structure of Formula 3 is a polymer of Formula 3A:



wherein,

c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker;

each of m^1 and n^1 is an integer from 0 to 1000; provided that the sum of $m^1 + n^1$ is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

R^1 is hydrogen, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, or a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more substituents;

each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

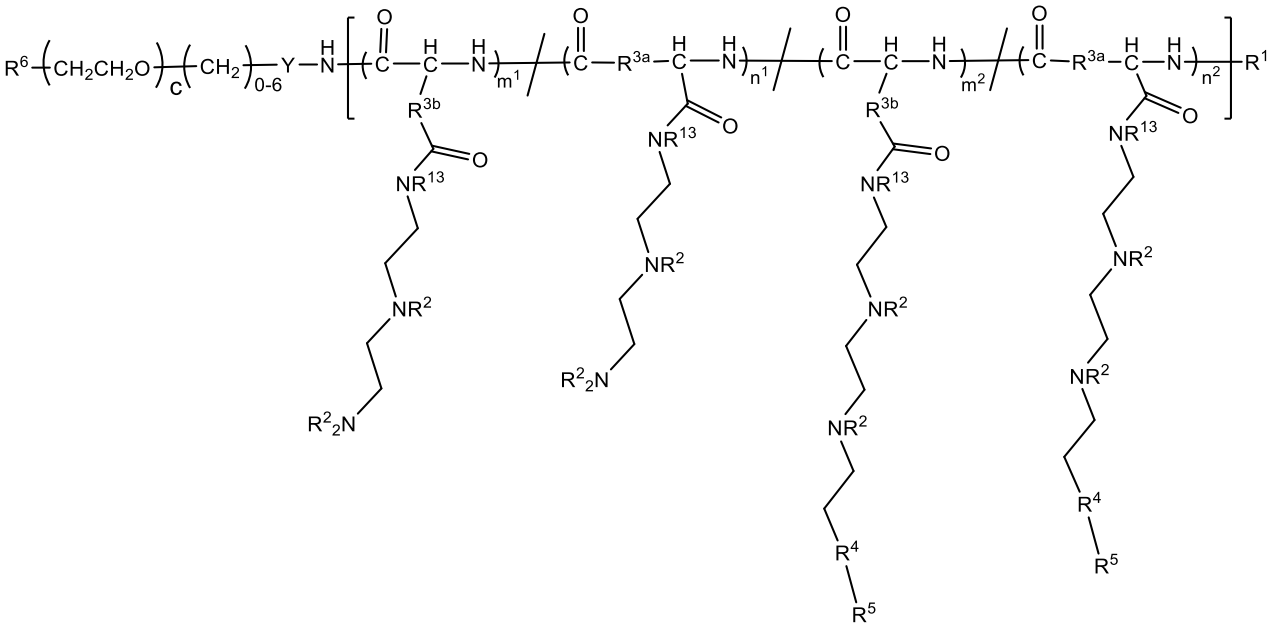
R^{3a} and R^{3a} are each independently a methylene or ethylene group; and

R^6 is hydrogen, an amino group, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more amines; or a tissue-specific or cell-specific targeting moiety;

each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

and

the polymer comprising a structure of Formula 1 is a polymer of Formula 1A:



wherein

c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker;

each of m^1 and n^1 is an integer from 0 to 1000;

each of m^2 and n^2 is an integer from 0 to 1000, provided that the sum of $m^2 + n^2$ is greater than 5;

the symbol "/" indicates that the units separated thereby are linked randomly or in any order;

R^1 is hydrogen, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, or a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more substituents;

each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

R^{3a} and R^{3a} are each independently a methylene or ethylene group;

each instance of R^4 is —C(O)O—, —C(O)NH—, or —S(O)(O)—;

each instance of R^5 is independently an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety;

R^6 is hydrogen, an amino group, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more amines; or a tissue-specific or cell-specific targeting moiety; and

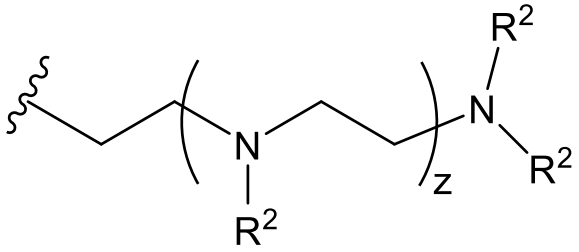
each instance of R^{13} is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group.

16. The method of any of claims 12-15, wherein each of A1 and A2 is a group of formula —$(CH_2)_{p1}$—[NH—$(CH_2)_{q1}$—]$_{r1}$$NH_2$, and each of B^1 and B^2 is a group of formula—$(CH_2)_{p1}$—[NH—$(CH_2)_{q1}$—]$_{r1}$NH-$(CH_2)_2$-R^4-R^5

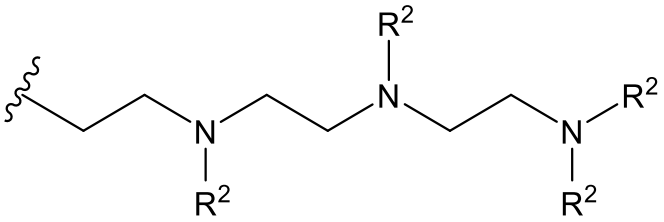
~~23~~17. The method of any of claims ~~19~~12-~~22~~16, wherein each of A^1 and A^2 is a group of formula –$(CH_2)_2$-NH-$(CH_2)_2$-NH_2, and each of B^1 and B^2 is a group of formula–$(CH_2)_2$-NH-$(CH_2)_2$-NH-$(CH_2)_2$-R^4-R^5.

~~24~~18. The method of any one of claims ~~19~~12-~~23~~17, wherein R^4 is –C(O)-O-.

~~25~~19. The method of ~~claim 23 or 24~~any one of claims 12-18, wherein R^5 is



or



.

~~26~~20. The method of any of claims ~~19-25~~12-19, wherein a sufficient number of A^1 and/or A^2 groups of the polymer comprising the structure of Formula 3 are modified to provide a polymer comprising a structure of Formula 1 in which the ratio of $(m^1+n^1)/(m^2+n^2)$ is about 20 or less, and, optionally, about 0.2 or more.

~~27~~21. A composition comprising a polymer of any one of claims 1-~~18~~11 and a nucleic acid and/or polypeptide.

~~28~~22. The composition of claim ~~27~~21, wherein the composition comprises a guide nucleic acid and/or donor nucleic acid.

~~29~~23. The composition of claim ~~27-~~21 or ~~28~~22, wherein the composition comprises an endonuclease.

~~30~~24. The composition of claim ~~29~~23, wherein the composition comprises an RNA-guided endonuclease or nucleic acid encoding same.

~~31~~25. The composition of claim ~~30~~24, wherein the RNA-guided endonuclease is Cas9, Cpf1, or a combination thereof.

~~32~~26. The composition of any one of claims ~~27~~21-~~31~~25, wherein the composition comprises a DNA recombinase.

~~33~~27. The composition of claim ~~32~~26, wherein the DNA recombinase is Cre recombinase.

~~34~~28. The composition of any one of claims ~~27~~21-~~33~~27, wherein the composition comprises a zinc finger nuclease.

~~35~~29. The composition of any one of claims ~~27~~21-~~34~~28, wherein the composition comprises a transcription activator-like effector nuclease.

30. The composition of any one of claims 21-29, wherein the composition comprises an siRNA or dsRNA.

~~36~~31. The composition of any one of claims ~~27~~21-~~35~~29, wherein the composition comprises a nanoparticle comprising the polymer of any of claims 1-9 and the nucleic acid or polypeptide.

~~37~~32. The composition of any one of claims ~~27~~21-~~36~~30, wherein the composition comprises a second polymer that comprises polyethylene oxide.

~~38~~33. A method of delivering a nucleic acid and/or polypeptide to a cell, the method comprising administering the composition of any one of claims ~~27~~21-~~37~~ 32 to the cell.

~~39~~34. The method of claim ~~38~~33, wherein the cell is in a subject and the composition ~~of any one of claims 27-37~~ is administered to the subject.

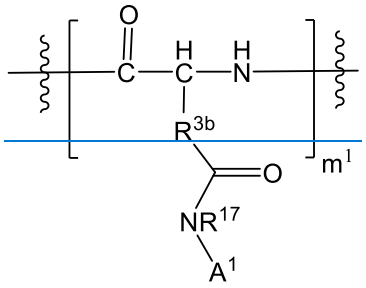
~~40~~35. The method of claim ~~38~~ 33 or ~~39~~34, wherein the polymer comprises a tissue-specific targeting moiety that localizes the polymer to tissues of the peripheral nervous system, the central nervous system, liver, muscle, lung, bone, or the eye of the subject.

~~41~~36. The method of claim ~~40~~35, wherein the polymer comprises a targeting moiety that preferentially binds to tumor cells.

~~42~~37. The method of any of claims ~~38~~33-~~41~~36, wherein the composition comprises one or more of an RNA guided endonuclease or nucleic acid encoding same, a guide nucleic acid, and a donor nucleic acid, and the composition facilitates editing of a target gene in the cell.

~~43~~38. The method of any of claims ~~38~~33-~~42~~37, wherein the cell is in a host, optionally a human, and the composition is delivered to the cell by administering the composition to the host.

~~44. A method of preparing a polymer comprising a structure of Formula 5:~~



~~wherein,~~

~~m^1 is an integer from 1 to 2000;~~

~~R^{3b} is a methylene or ethylene group;~~

~~R^{17} is hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;~~

~~A^1 is a group of formula~~

~~$-(CH_2)_{p1}-[NR^2-(CH_2)_{q1}-]_{r1}NR^2_2$;~~

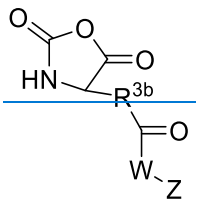
~~$-(CH_2)_{p2}-N[-(CH_2)_{q2}-NR^2_2]_2$;~~

~~$-(CH_2)_{p3}-N\{[-(CH_2)_{q3}-NR^2_2][-(CH_2)_{q4}-NR^2-]_{r2}R^2\}$; or~~

~~$-(CH_2)_{p4}-N\{-(CH_2)_{q5}-N[-(CH_2)_{q6}-NR^2_2]_2\}_2$;~~

~~wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5; and each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group,~~

~~from a compound of Formula A:~~



~~wherein,~~

~~R^{3b} is a methylene or ethylene group;~~

~~W is $-NR^{14}-$ or $-O-$, wherein R^{14} is hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;~~

Z is A^1, or an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, arylalkyl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines or a substituent comprising a tissue-specific or cell-specific targeting moiety;

A^1 is a group of formula

$-(CH_2)_{p1}-[NR^2-(CH_2)_{q1}-]_{r1}NR^2{}_2$;

$-(CH_2)_{p2}-N[-(CH_2)_{q2}-NR^2{}_2]_2$;

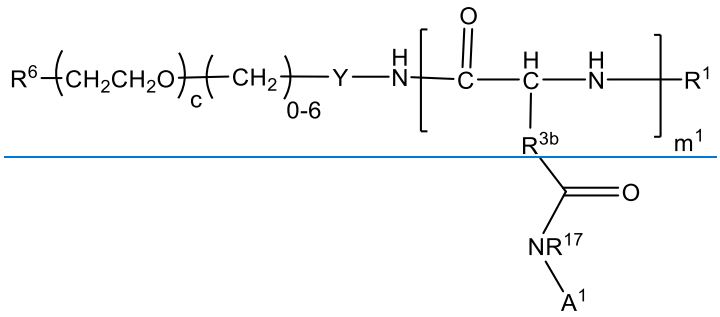
$-(CH_2)_{p3}-N\{[-(CH_2)_{q3}-NR^2{}_2][-(CH_2)_{q4}-NR^2-]_{r2}R^2\}$; or

$-(CH_2)_{p4}-N\{-(CH_2)_{q5}-N[-(CH_2)_{q6}-NR^2{}_2]_2\}_2$,

wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5; and each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group,

the method comprising a ring-opening polymerization of the compound Formula A.

45. The method of claim 44, wherein the polymer comprising a structure of Formula 5 is a polymer of Formula 5A:



wherein,

c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker;

m^1 is an integer from 1 to 2000;

R^{3a} is a methylene or ethylene group;

R^6 is hydrogen, an amino group, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more amines; or a tissue-specific or cell-specific targeting moiety;

R^1 is hydrogen, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, or a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more substituents;

R^{17} is hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group;

A^1 is a group of formula

$-(CH_2)_{p1}-[NR^2-(CH_2)_{q1}-]_{r1}NR^2_2$;

$-(CH_2)_{p2}-N[-(CH_2)_{q2}-NR^2_2]_2$;

$-(CH_2)_{p3}-N\{[-(CH_2)_{q3}-NR^2_2][-(CH_2)_{q4}-NR^2-]_{r2}R^2\}$; or

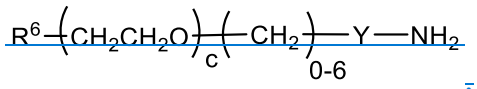
$-(CH_2)_{p4}-N\{-(CH_2)_{q5}-N[-(CH_2)_{q6}-NR^2_2]_2\}_2$,

wherein p1 to p4, q1 to q6, and r1 and r2 are each independently an integer of 1 to 5; and each instance of R^2 is independently hydrogen or a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group.

46. The method of claim 44 or 45, wherein A^1 is a group of formula $-(CH_2)_2$-NR^2-$(CH_2)_2$-NR^2_2.

47. The method of any one of claims 44-46, wherein the ring-opening polymerization of the compound Formula A is initiated with an amine-containing compound.

48. The method of claim 47, wherein the amine-containing compound is of the formula:



,

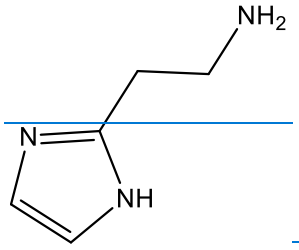
wherein,

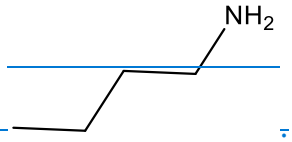
c is an integer from 0 to 50;

Y is optionally present and is a cleavable linker; and

R^6 is hydrogen, an amino group, an aryl group, a heterocyclic group, a C_1-C_{12} alkyl group, alkenyl group, cycloalkyl group, or cycloalkenyl group, a C_1-C_{12} linear or branched alkyl group optionally substituted with one or more amines; or a tissue-specific or cell-specific targeting moiety.

49. The method of claim 47 or 48, wherein the amine-containing compound is



or 

.

50. The method of any of claims 44-49, wherein:

in the compound of Formula A, W is –O–, and Z is an alkyl group, cycloalkyl group, alkenyl group, cycloalkenyl group, aryl group, arylalkyl group, heteroalkyl group, heterocyclic group, or combination thereof optionally comprising from 1 to 8 secondary or tertiary amines;

and the method further comprises, after ring opening polymerization, treating the resulting intermediate polymer with a compound of the formula NHR^{14}-A^1, wherein A^1 is as defined with respect to Formula 5.