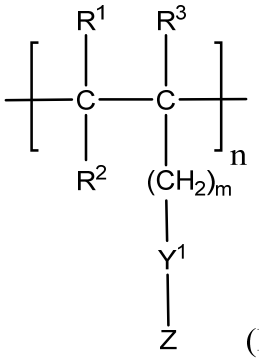
Claims:

1. A polymer comprising a repeat unit of Formula (I),



(I),

or a pharmaceutically acceptable salt thereof wherein,

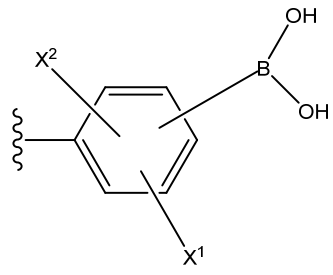
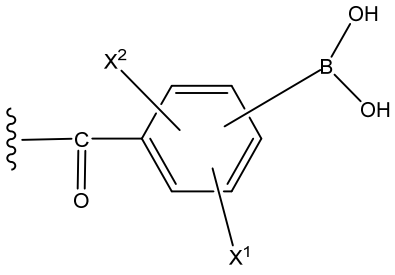
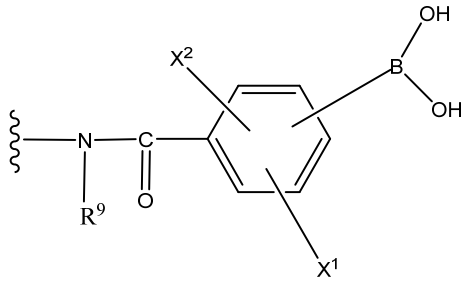
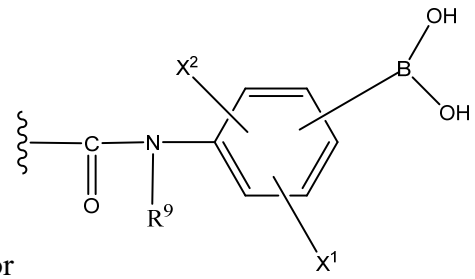
R^1, R^2, and R^3 are independently hydrogen, or substituted or unsubstituted alkyl;

Y^1 is independently a direct bond or $–L^1–A^1–L^2–A^2–$;

L^1 is $–NR^9–$, $–NC(O)–$, or $–C(O)N–$;

L^2 is absent, $–NR^9–$, $–O–$, or $–S–$;

A^1 and A^2 are independently absent or optionally substituted C_1-C_5 alkylene;

Z is , , , or , wherein the $–B(OH)_2$ is at the 3- or 4-position of the phenyl ring with respect to Y^1;

X^1 and X^2 are independently selected from a group consisting of hydrogen, halo, $–CN$, $–NO_2$, $–N^+(R^9)(R^{10})(R^{11})$, $–CF_3$, $–SO_3(R^9)$, $–SO_2(R^9)$, $–CON(R^9)(R^{10})$, $–(CH_2)_m$-$N(R^9)(R^{10})$, and $–OR^9$;

R^9, R^{10}, and R^{11} in each occurrence are independently hydrogen or substituted or unsubstituted alkyl;

n is an integer from 1 to 100,000, and

m in each occurrence is independently an integer from 1 to 4;

with the proviso that no more than one of X^1 and X^2 is hydrogen; and

when either X^1 or X^2 is $–(CH_2)_m$-$N(R^9)(R^{10})$, it is bonded to the carbon atom in the phenyl ring that is adjacent to the carbon atom in the phenyl ring to which $–B(OH)_2$ is bonded, and the other of X^1 and X^2 is hydrogen.

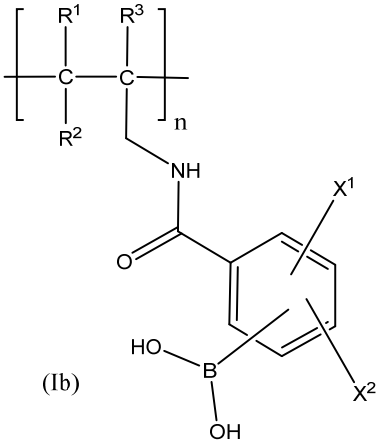
2. The polymer of claim 1, wherein,

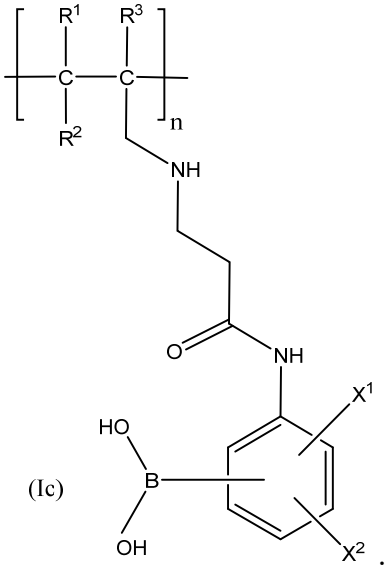
Y^1 is a direct bond, or

Y^1 is $–L^1–A^1–L^2–A^2–$, wherein L^1 is $–NR^9–$, and A^1, L^2, and A^2 are each absent; and

X^1 and X^2 are each independently selected from a group consisting of hydrogen, halo, and $–CF_3$, with the proviso that no more than one of X^1 and X^2 is hydrogen.

3. The polymer of claim 1 or 2, wherein the repeat unit of Formula (I) is selected from the group consisting of

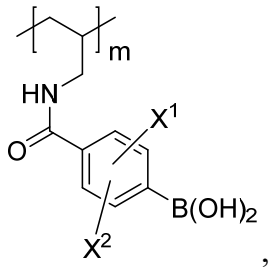
(Ib) 

and (Ic) .

4. The polymer of any one of the preceding claims, wherein R^1, R^2, and R^3 are each hydrogen.

5. The polymer of any one of the preceding claims, wherein at least one of X^1 and X^2 is fluoro.

6. The polymer of any one of the preceding claims, wherein the repeat unit of Formula (I) comprises the structure:



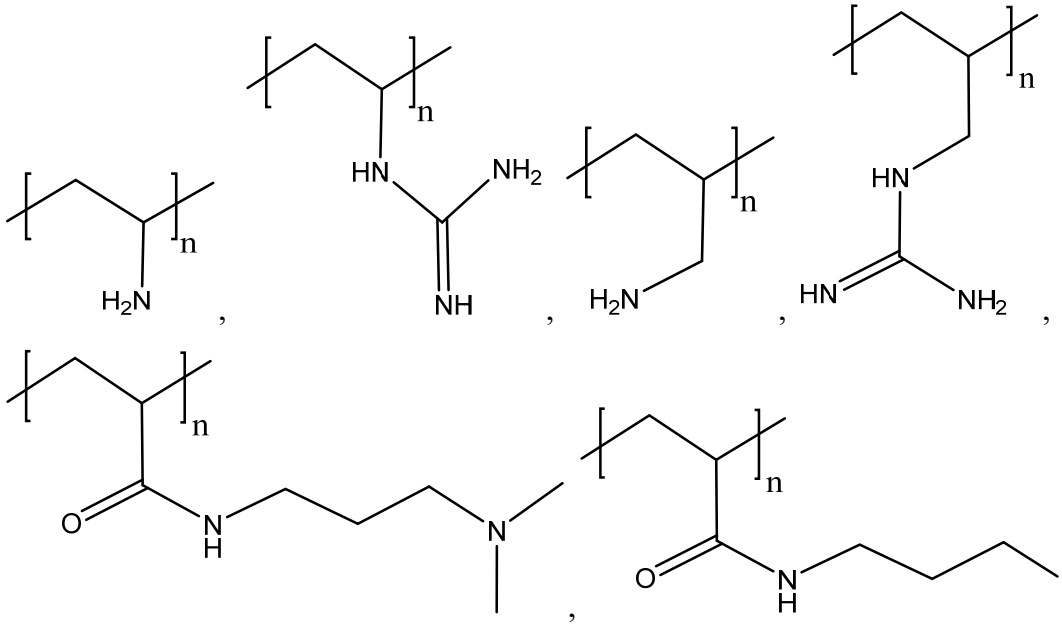
,

or a pharmaceutically acceptable salt thereof, wherein

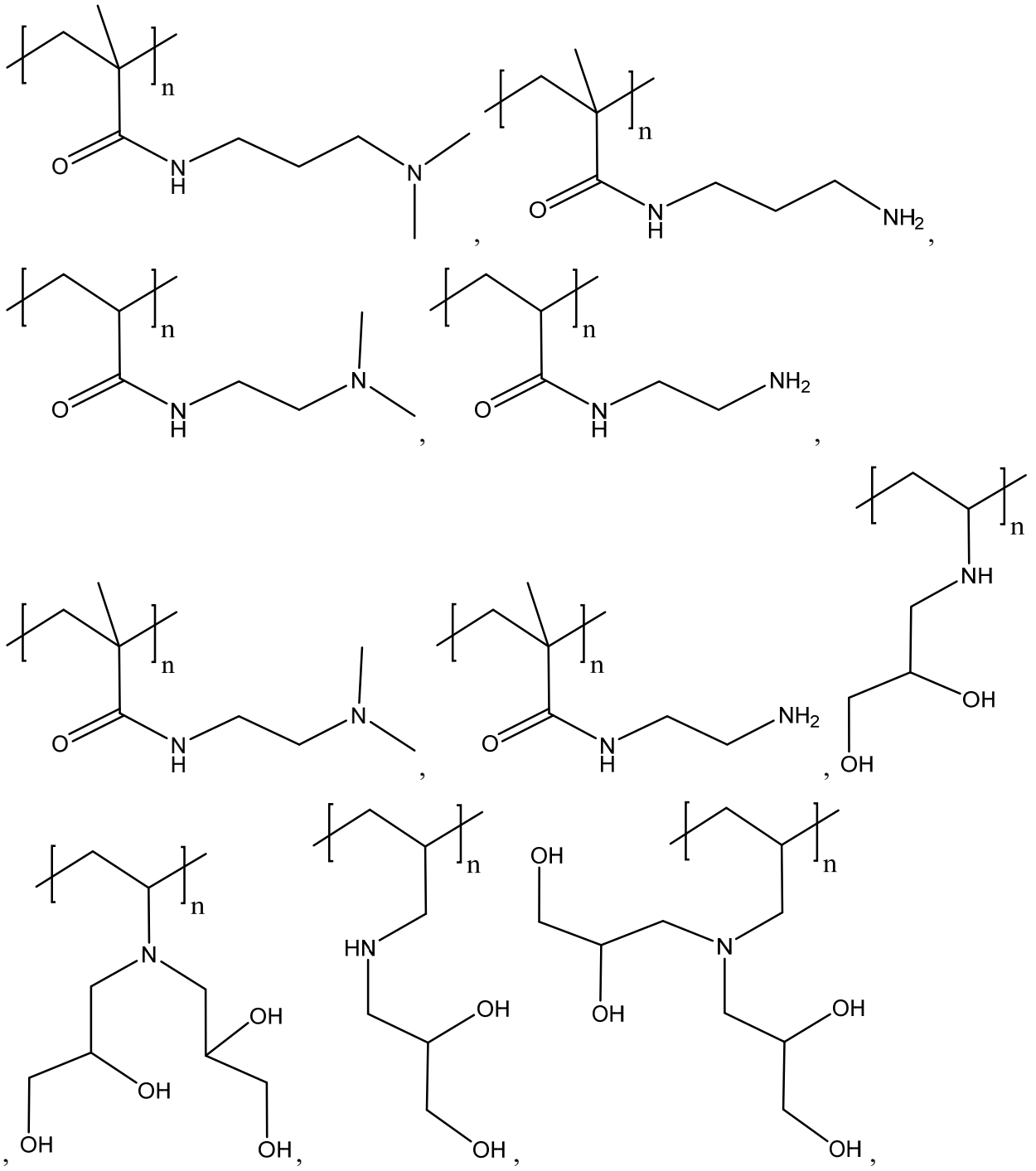
m is an integer from 1 to 100,000; and

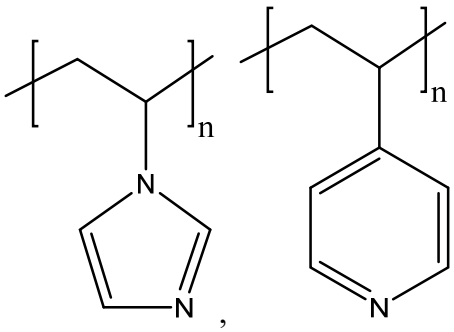
X^1 and X^2 are each independently selected from a group consisting of hydrogen, halo, and $–CF_3$; with the proviso that no more than one of X^1 and X^2 is hydrogen.

7. The polymer of any one of the preceding claims, further comprising at least one repeat unit selected from the group consisting of

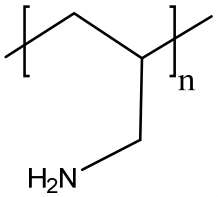


,





, , and pharmaceutically acceptable salts thereof, where n represents an integer from 1 to 100,000.

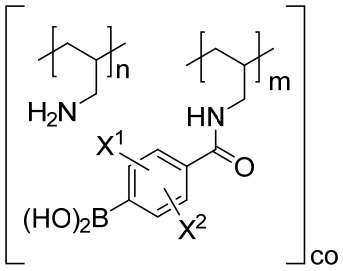
8. The polymer of any one of the preceding claims, wherein the polymer comprises at least one repeat unit of 

, or a pharmaceutically acceptable salt thereof, wherein n is an integer from 1 to 100,000.

9. The polymer of any one of the preceding claims, wherein the polymer comprises two repeat units, and about 5% to about 50% of the total repeat units in the polymer comprise Formula (I).

10. The polymer of any one of the preceding claims, wherein the polymer comprises two repeat units, and about 5% to about 20% of the total repeat units in the polymer comprise Formula (I).

11. A polymer that comprises the structure:



or a pharmaceutically acceptable salt thereof, wherein:

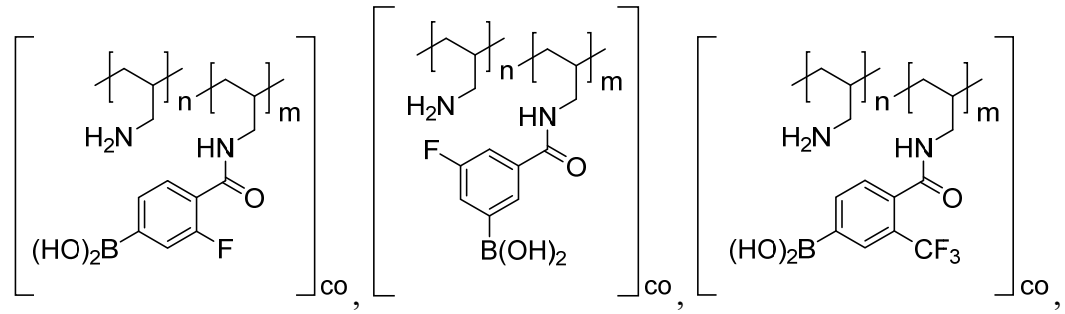
X^1 and X^2 are each independently selected from a group consisting of hydrogen, halo, and $–CF_3$, with the proviso that no more than one of X^1 and X^2 is hydrogen; and

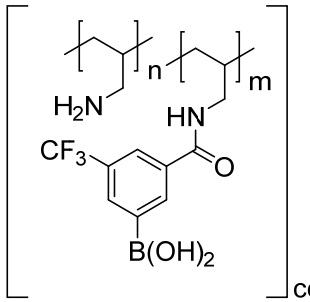
each n and m are independently an integer from 1 to 100,000,

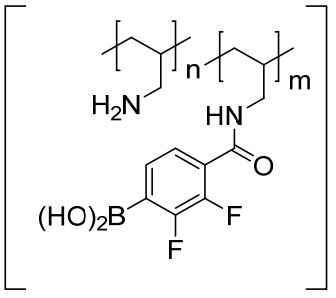
wherein co denotes copolymer.

12. The polymer of claim 11, wherein at least one of X^1 and X^2 is fluoro.

13. A polymer selected from the group consisting of:







, and pharmaceutically acceptable salts thereof, wherein co denotes copolymer.

14. The polymer of any one of the preceding claims, wherein the polymer has mucin complexing activity.

15. The polymer of any one of the preceding claims, wherein the polymer is water soluble.

16. The polymer of any one of the preceding claims, wherein the polymer can form a physical barrier between an intestinal lining and luminal contents when administered to the gastrointestinal tract of a subject.

17. A pharmaceutical composition comprising a polymer of any one of the preceding claims, and a pharmaceutically acceptable excipient, adjuvant, binder, diluent, disintegrant, filler, or lubricant.

18. The pharmaceutical composition of claim 17, wherein the pharmaceutical composition is for oral administration.

19. The pharmaceutical composition of claim 17 or 18, wherein the composition is in a dosage form selected from the group consisting of a powder, a tablet, a caplet, a granule, and a capsule.

20. The pharmaceutical composition of claim 19, wherein the dosage form is an enteric coated tablet, caplet or capsule.

21. The pharmaceutical composition of any one of claims 17-20, comprising a carbohydrate, a calcium salt, corn starch, mannitol, xylitol, cellulose or a derivative thereof, microcrystalline cellulose, gelatin, a stearate, silicon dioxide, talc, sodium starch glycolate, acacia, a flavoring agent, a preservative, a buffering agent, a colorant, or a combination thereof.

22. The pharmaceutical composition of any one of claims 17-21, further comprising an additional therapeutic agent.

23. The pharmaceutical composition of claim 22, wherein the additional therapeutic agent comprises a GLP-1 receptor agonist, a DPP-4 inhibitor, an SGLT-2 inhibitor, a glucosidase inhibitor, an insulin, a biguanide, a sulfonylurea, a meglitinide, a thiazolidinedione, an amylin mimetic, a D2-dopamine agonist, or a bile acid sequestrant.

24. A polymer of any one of claims 1-16, or a pharmaceutical composition of any one of claims 17-23, for use in treating a metabolic disorder or a gastrointestinal disorder.

25. The polymer or pharmaceutical composition for use of claim 24, wherein the metabolic disorder is glucose intolerance, type-1 diabetes mellitus (T1DM), type-2 diabetes mellitus (T2DM), prediabetes, hyperlipidemia, obesity, overweight, dyslipidemia, hypertension, hyperglycemia, impaired glucose tolerance, insulin resistance, metabolic syndrome, non-alcoholic steatohepatitis (NASH), non-alcoholic fatty liver disease (NAFLD), or polycystic

ovary syndrome (PCOS).

26. The polymer or pharmaceutical composition for use of claim 24 or 25, wherein the metabolic disorder is T2DM.

27. The polymer or pharmaceutical composition for use of any one of claims 24-26, wherein the treating comprises the use of an additional therapeutic agent.

28. The polymer or pharmaceutical composition for use of claim 27, wherein the additional therapeutic agent comprises a GLP-1 receptor agonist, a DPP-4 inhibitor, an SGLT-2 inhibitor, a glucosidase inhibitor, an insulin, a biguanide, a sulfonylurea, a meglitinide, a thiazolidinedione, an amylin mimetic, a D2-dopamine agonist, or a bile acid sequestrant.

29. Use of a polymer of any one of claims 1-16 or a pharmaceutical composition of any one of claims 17-23, in the manufacture of a medicament for treating a metabolic disorder or a gastrointestinal disorder.

30. The use of claim 29, wherein the metabolic disorder is glucose intolerance, type-1 diabetes mellitus (T1DM), type-2 diabetes mellitus (T2DM), prediabetes, hyperlipidemia, obesity, overweight, dyslipidemia, hypertension, hyperglycemia, impaired glucose tolerance, insulin resistance, metabolic syndrome, non-alcoholic steatohepatitis (NASH), non-alcoholic fatty liver disease (NAFLD), or polycystic ovary syndrome (PCOS).

31. The use of claim 29 or 30, wherein the metabolic disorder is T2DM.

32. The use of any one of claims 29-31, wherein the treating comprises the use of an additional therapeutic agent.

33. The use of claim 32, wherein the additional therapeutic agent comprises a GLP-1 receptor agonist, a DPP-4 inhibitor, an SGLT-2 inhibitor, a glucosidase inhibitor, an insulin, a biguanide, a sulfonylurea, a meglitinide, a thiazolidinedione, an amylin mimetic, a D2-dopamine agonist, or

a bile acid sequestrant.