

[0075] In one embodiment, provided herein is a chemical entity comprising an anchor region (A) and an indicator region (I) comprising a polypeptide comprising the amino acid sequence set forth in (a) $X_yN^4N^3N^2N^1X_y-Z$ (SEQ ID NO: 5), or (b) $X_yN^4N^3N^2N^1X_y-L-Z$ (SEQ ID NO: 6), wherein X is each, independently any amino acid; y is each, independently, a number selected from 0 to 6; N^4 is selected from alanine, glycine, valine, and glutamine; N^3 is selected from alanine, glycine, proline, lysine, and serine; N^2 is selected from proline, alanine, and glycine; N^1 is selected from serine, lysine, phenylalanine, arginine, leucine, and methionine; L is a linking moiety; and Z comprises a detectable label.

[0075a] In one embodiment, provided herein is a chemical entity comprising a compound of Formula I:

A-I

Formula I

wherein

A is an anchor;

I is an indicator region;

the anchor A is covalently associated with the indicator region I via a covalent interaction to form a recognition site S;

the anchor A comprises a polysaccharide, a cellulose, a polyacrylate, a polyethyleneimine, a polyacrylamide, a peptidoglycan, or a chitosan, or a monomer thereof, an oligomer thereof, a derivative thereof, a mixture or a combination thereof;

the indicator region I or a motif therein attached to the anchor A is a substrate for a glycosidase; and

the indicator region I or a motif therein is attached to an 1 α -carbon of chitosan or a monomer thereof, an oligomer thereof, or a derivative thereof.

[0076] It is understood that other embodiments and configurations of the subject technology will become readily apparent to those skilled in the art from the following detailed description, wherein various configurations of the subject technology are shown and described by way of example or illustration. As will be realized, the subject technology is capable of other and different configurations and its several details are capable of modification in various other respects, all without departing from the scope of the subject technology. Accordingly, the figures and detailed description are to be regarded as illustrative in nature and not as restrictive.

BRIEF DESCRIPTION OF THE FIGURES

[0077] To understand the present disclosure, it will now be described by way of example, with reference to the accompanying figures in which embodiments and examples of the disclosures are illustrated and, together with the descriptions below, serve to explain the principles of the disclosure.

[0078] **FIG. 1:** Infrared spectrum of Example 2. Chitosan derivatives with varying degree of acetylation (DA) were produced, but only material with a DA of 48 % was further used.

[0079] **FIG. 2:** Infrared spectrum and NMR spectrum of Example 2. Chitosan derivatives with varying DA were produced, but only material with a DA of 48 % was further used.

[0080] **FIG. 3:** Infrared spectrum of chitooligosaccharides of Example 5.

[0081] **FIG. 4:** Infrared spectrum of chitooligosaccharides of Example 6.

[0082] **FIG. 5:** Time course of dye release from dye conjugated acetyl chitosan when incubated with 5000 units per mL lysozyme.

[0083] **FIG. 6:** (A) Time course of dye release from dye conjugated acetyl chitosan when incubated with 5000 units per mL lysozyme in phosphate buffer when the chitosan has varying concentrations of dye conjugated; (B) Time course of dye release from dye conjugated acetyl chitosan when incubated with 5000 units per mL lysozyme in either phosphate buffer or artificial wound fluid containing 2% protein as BSA.

CLAIMS

1. A chemical entity comprising a compound of Formula I:

A-I

Formula I

wherein

A is an anchor;

I is an indicator region;

the anchor A is covalently associated with the indicator region I via a covalent interaction to form a recognition site S;

the anchor A comprises a polysaccharide, a cellulose, a polyacrylate, a polyethyleneimine, a polyacrylamide, a peptidoglycan, or a chitosan, or a monomer thereof, an oligomer thereof, a derivative thereof, a mixture or a combination thereof;

the indicator region I or a motif therein attached to the anchor A is a substrate for a glycosidase; and

the indicator region I or a motif therein is attached to an 1 α -carbon of chitosan or a monomer thereof, an oligomer thereof, or a derivative thereof.

2. The chemical entity of claim 1, wherein the recognition site S is specific for a wound-specific hydrolase.

3. The chemical entity of claim 1, wherein the anchor A comprises chitosan or a monomer thereof, an oligomer thereof, a derivative thereof, a mixture or a combination thereof.

4. The chemical entity of claim 3, wherein the monomer of chitosan comprises D-glucosamine and N-acetyl-D-glucosamine, an oligomer thereof, or a combination thereof.

5. The chemical entity of claim 3, wherein the chitosan comprises at least two units of D-glucosamine, N-acetyl-D-glucosamine or a combination thereof.

6. The chemical entity of claim 3, wherein the chitosan derivative comprises a randomly substituted partial N-, partial O-acetylated chitosan, chitosan oligosaccharide, carboxymethyl chitosan, or hydroxyalkyl chitosan.

7. The chemical entity of claim 6, wherein the chitosan derivative comprises randomly substituted partial N-, partial O-acetylated chitosan.

8. The chemical entity of claim 7, wherein the chitosan derivative is an acetylated chitosan comprising a degree of acetylation (DA) between about 40% to about 90%.

9. The chemical entity of claim 7, wherein the chitosan derivative is an acetylated chitosan comprising a degree of acetylation (DA) of greater than 50%.

10. The chemical entity of claim 7, wherein the chitosan derivative is halogenated.

11. The chemical entity of claim 3, wherein the anchor A comprises a chitosan compound or a derivative thereof selected from the group consisting of chitosan, N-acetyl chitosan; oligo- β -D-1,4-glucosamine; acetyl-D-glucopyranoside; N-Acetylglucosamine (GlcNAc); glucosamine dimer (GlcNAc)₂; acetyl-chitosan; chitobiose octaacetate; a chitooligomer comprising the structure (GlcNAc)_n wherein n=4, 5, or 6; a chitooligosaccharide; 2-acetamido-2-deoxy-D-glucopyranoside; 2-deoxy-3,4,6-tri-O-acetyl-D-glucopyranoside; an oligomer thereof; or a combination thereof.

12. The chemical entity of claim 10, wherein the indicator region (I) or a motif therein attached to the anchor A is a substrate for a glycosidase which is lysozyme.

13. The chemical entity of claim 1, wherein the indicator region I comprises a dye containing a sulfonylethyl-hydrogensulphate-reactive-group or a dye containing a dichlortriazine reactive-group.

14. The chemical entity of claim 13, wherein the dye containing a sulfonylethyl-hydrogensulphate-reactive-group is reactive black 5, remazol brilliant blue, reactive violet 5 or reactive orange 16 or a combination thereof.

15. The chemical entity of claim 13, wherein the dye containing a dichlortriazine reactive-group is reactive blue 4, reactive red 120, reactive blue 2, reactive green 19, or reactive brown 10, or a combination thereof.

16. The chemical entity of claim 1, wherein the indicator region I comprises a detectable label selected from the group consisting of a luminescent molecule, a chemiluminescent molecule, a fluorochrome, a fluorescent quenching agent, a lipid, a colored molecule, a radioisotope, a scintillant, biotin, avidin, streptavidin, protein A, protein G, an antibody or a fragment thereof, a polyhistidine, Ni²⁺, a Flag tag, a myc tag, a heavy metal, and an enzyme.

17. The chemical entity of claim 1, wherein the anchor A is conjugated with the indicator region I directly via a glycosidic linkage.

18. The chemical entity of claim 17, wherein the anchor A comprises a compound selected from the group consisting of chitosan, N-acetyl chitosan; oligo- β -D-1,4-glucosamine; acetyl-D-glucopyranoside; N-Acetylglucosamine (GlcNAc); glucosamine dimer (GlcNAc)₂; acetyl-chitosan; chitobiose octaacetate; a chitooligomer comprising the structure (GlcNAc)_n wherein n=4, 5, or 6; a chitooligosaccharide; 2-acetamido-2-deoxy-D-glucopyranoside; 2-deoxy-3,4,6-tri-O-acetyl-D-glucopyranoside; or a combination thereof.

19. The chemical entity of claim 17, wherein the indicator region I comprises reactive black 5, remazol brilliant blue, reactive violet 5 or reactive orange 16, reactive blue 4, reactive red 120, reactive blue 2, reactive green 19 and reactive brown 10, or a combination thereof.

20. The chemical entity of claim 1, wherein the indicator region I comprises a hydrophilic binding module (CBM) from Cellobiohydrolase I (*Trichoderma reesei*) or the hydrophobic binding module (PDB) from Polyhydroxyalkanoate depolymerase (*Alcaligenes faecalis*) or a chimeric variant thereof.

21. The chemical entity of claim 20, wherein the anchor A comprises cellulose or a derivative thereof or polyethylene terephthalate or a derivative thereof.

22. The chemical entity of claim 21, wherein the indicator region I comprises a hydrophilic binding module (CBM) from Cellobiohydrolase I (*Trichoderma reesei*) and the

anchor A comprises cellulose or a derivative thereof, wherein the indicator region I is hydrophilically associated with the anchor A.

23. The chemical entity of claim 20, wherein the indicator region I comprises Polyhydroxyalkanoate depolymerase (*Alcaligenes faecalis*) and the anchor A comprises polyethylene terephthalate or a derivative thereof, wherein the indicator region I is hydrophobically associated with the anchor A.