CLAIMS

1) A method of localising a functional moiety (F) to at least one discrete area on a surface of a substrate including the step of propelling droplets of a dispersion of a synthetic construct of the structure F-S-L from a plurality of orifices located in a monolithic print head onto the surface of the substrate where:
   - S is a spacer selected to provide a construct that is dispersible in water in the absence of organic solvents or detergents at a temperature of 25 °C; and
   - L is a diacyl- or dialkyl lipid.

2) The method of claim 1 where F is biotin, a glycan or a peptide.

3) The method of claim 1 where the at least one discrete area is in the shape of a symbol.

4) The method of claim 3 where the at least one discrete area is in the shape of a symbol readable by optical character recognition (OCR) apparatus.

5) The method of claim 4 where the at least one discrete area is in the shape of a symbol comprising one or more alphanumeric characters.

6) The method of claim 1 where the at least one discrete area is a pattern comprising a combination of indicia in which the dispersion of a synthetic construct is present at different densities.

7) The method of claim 1 where the substrate is selected from the group consisting of: derivatised silica gel (e.g. C_8 or C_{18}), nitrocellulose, coated paper, silica gel or uncoated paper.

8) The method of claim 7 where the substrate is selected from the group consisting of: coated paper or uncoated paper.

9) The method of claim 1 where the method is a non-impact method of printing.

10) The method of claim 9 where the propelling droplets from a plurality of orifices is from a plurality of orifices located in a monolithic print head of an inkjet printer.

11) The method of claim 10 where the propelling droplets from a plurality of orifices is from a plurality of orifices located in a monolithic print head of a piezoelectric inkjet printer.

12) The method of claim 1 where the volume of each of the droplets is 1 to 100 picolitres (pL).

13) The method of claim 12 where the volume of each of the droplets is 1 to 50 pL.

14) The method of claim 13 where the volume of each of the droplets is 1 to 5 pL.

15) The method of claim 1 where the concentration of the synthetic construct in the dispersion is 1 µmolar (µM) to 10 mmolar (mM).

16) The method of claim 16 where the concentration of the synthetic construct in the dispersion is 10 µM to 10 mM.

17) The method of claim 17 where the concentration of the synthetic construct in the dispersion is 0.1 to 10 mM.

18) The method of claim 1 where the synthetic construct of the structure F-S-L is dispersible in water in the absence of

organic solvents or detergents at a temperature of 25 °C at a concentration of at least 6 millimolar (mM).

19) The method of claim 18 where the synthetic construct of the structure F-S-L is dispersible in water in the absence of organic solvents or detergents at a temperature of 25 °C at a concentration of at least 12 millimolar (mM).

20) The method of claim 1 where L is a glycerophospholipid.

21) The method of claim 20 where L is a phosphatidylethanolamine.

22) The method of claim 21 where L is selected from the group consisting of: 1,2-O-dioleoyl-sn-glycero-3-phosphatidylethanolamine (DOPE) and 1,2-O-distearyl-sn-glycero-3-phosphatidylethanolamine (DSPE).

23) The method of claim 1 where F is a glycan.

24) The method of claim 23 where F is a glycan that is an oligosaccharide.

25) The method of claim 24 where F is a glycan that is an oligosaccharide selected from the group consisting of: GalNAcα3(Fucα2)Galβ-; Galα3(Fucα2)Galβ-; GalNα3(Fucα2)Galβ-; Fucα2Galβ-; Galβ4GlcNAcβ3(Galβ4GlcNAcβ6)Galβ-; Galβ4GlcNAcβ3-; Galβ4Glcβ-; Galβ3GlcNAcβ-; Galβ3(Fucα4)GlcNAcβ-; Fucα2Galβ3(Fucα4)GlcNAcβ-;GalNAcα3(Fucα2)Galβ3(Fucα4)GlcNAcβ-; Galα3(Fucα2)Galβ3(Fucα4)GlcNAcβ-; Galβ4(Fucα3)GlcNAcβ-; Fucα2Galβ4(Fucα3)GlcNAcβ-; NeuAcα2-3Galβ3(Fucα4)GlcNAcβ-; NeuAcα2-3Galβ4(Fucα3)GlcNAcβ-; GalNAcβ4(NeuAcα2-3)Galβ4-; Galβ3GalNAcα-; NeuAcα2-3Galβ4-; NeuAcα2-6Galβ4-; Galα4Galβ4-; GalNAcβ3Galα4Galβ4-; Galα4Galβ4GlcNAcβ3-; Galβ3GalNAcβ3Galα4-; NeuAcα2-3Galβ3GalNAcβ3Galα4-; Galα3Galβ-; GalNAcα3GalNAcβ3Galα4-; GalNAcβ3GalNAcβ3Galα4-; Galβ1-

4GlcNAc; Galβ1-3GlcNAc; SAα2-6Galβ1-4Glc; SAα2-3Galβ1-4Glc; SAα2-6Galβ1-4GlcNAc; SAα2-3Galβ1-4GlcNAc; SAα2-3Galβ1-3GlcNAc; Galβ1-4(Fucα1-3)GlcNAc; Galβ1-3(Fucα1-3)GlcNAc; SAα2-3Galβ1-3(Fucα1-4)GlcNAc; SAα2-3Galβ1-4(Fucα1-3)GlcNAc; Galβ1-4GlcNAcβ1-4GlcNAc; Galβ1-3GlcNAcβ1-4GlcNAc; SAα2-6Galβ1-4GlcNAcβ1-4GlcNAc; SAα2-3Galβ1-4GlcNAcβ1-4GlcNAc; SAα2-3Galβ1-3GlcNAcβ1-4GlcNAc; Galβ1-4(Fucα1-3)GlcNAcβ1-4GlcNAc; Galβ1-3(Fucα1-4)GlcNAcβ1-4GlcNAc; SAα2-3Galβ1-3(Fucα1-4)GlcNAcβ1-4GlcNAc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-4GlcNAc; SAα2-3Galβ1-3(Fucα1-4)GlcNAcβ1-4Gal; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-4Gal; SAα2-3Galβ1-4GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAc; SAα2-6Galβ1-4GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAα2-6Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAα2-3Galβ1-4GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAα2-6Galβ1-4GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAα2-6Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-6Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-3Galβ1-4GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-6Galβ1-4GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-6Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-3Galβ1-3(Fucα1-4)GlcNAc; SAα2-6Galβ1-3(Fucα1-4(GlcNAc; SAα2-3Galβ1-3GlcNAcβ1-4Galβ1-4(Fucα1-3)GlcNAc; SAα2-6Galβ1-3GlcNAcβ1-4Galβ1-4(Fucα1-3)GlcNAc; SAα2-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAc; SAα2-6Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAc; SAα2-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4Glc; SAα2-6Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4Glc; SAα2-3Galβ1-3GlcNAcβ1-4Galβ1-4(Fucα1-3)GlcNAcβ1-

3Galβ1-4Glc; SAα2-6Galβ1-3GlcNAcβ1-4Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAβ2-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAα2-6Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4Glc; SAα2-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-6Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-3Galβ1-3GlcNAcβ1-4Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-6Galβ1-3GlcNAcβ1-4Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-6Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-3Galβ1-4GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAc; SAα2-6Galβ1-4GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAc; SAα2-6Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAc; SAα2-3Galβ1-4GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4Glc; SAα2-6Galβ1-4GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4Glc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4Glc; SAα2-6Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4Glc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-3(Fucα1-4)Glc; SAα2-6Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-3(Fucα1-4)Glc; SAα2-3Galβ1-4GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-6Galβ1-4GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; SAα2-3Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc; and SAα2-6Galβ1-4(Fucα1-3)GlcNAcβ1-3Galβ1-3(Fucα1-4)GlcNAcβ1-3Galβ1-4(Fucα1-3)Glc, where SA is sialic acid.

26) The method of claim 1 where F is a peptide.

27) The method of claim 26 where F is a peptide that is an oligopeptide.

28) The method of claim 1 where F is a peptide selected from the group listed in the Table of Peptides.

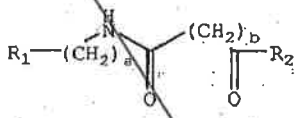
29) The method of claim 1 where F is a conjugator.

30) The method of claim 29 where F is a conjugator that is biotin.

31) The method of claim 1 where the method includes the step of coating the surface of the substrate with a polymer after the propelling of the droplets of the dispersion of the synthetic construct of the structure F-S-L onto the surface of the substrate.

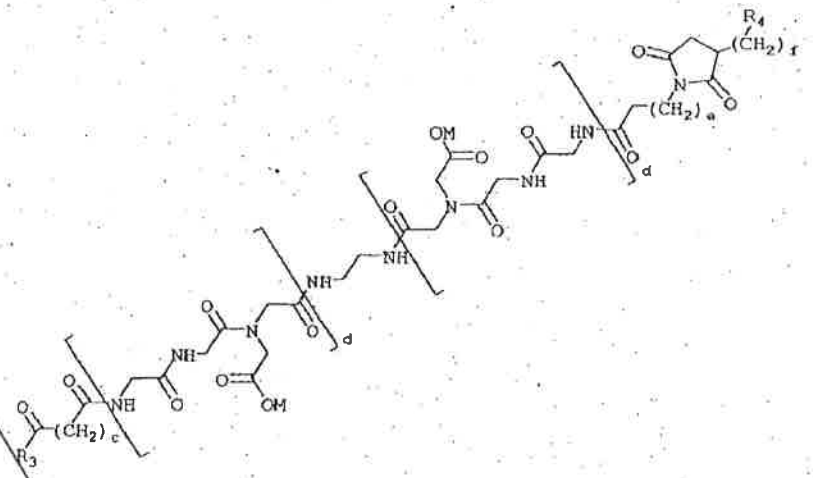
32) The method of claim 31 where the method includes the step of coating the surface of the substrate with isobutyl methacrylate polymer after the propelling of the droplets of the dispersion of the synthetic construct of the structure F-S-L.

33) The method of claim 1 where when F is a glycan, S is selected from the group consisting of:



where:

a and b are independently the integer 3, 4 or 5; and R_1 and R_2 are, respectively, O of the glycan and N of the primary amino of a diacyl or dialkyl-glycerophospholipid or N of the primary amino of a diacyl or dialkyl-glycerophospholipid and O of the glycan, or



where:

M is CH_3 or H;

c is the integer 3, 4 or 5;

d and e are independently the integer 1 or 2;

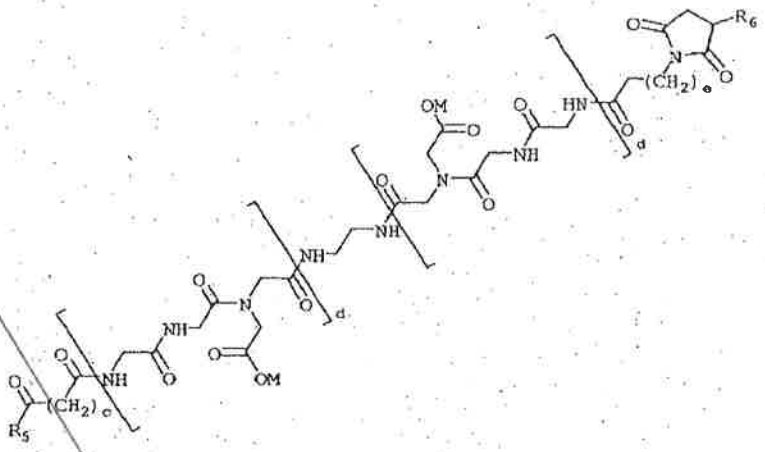
f is the integer 2, 3 or 4;

R_3 is N of the primary amino of a diacyl or dialkyl-glycerophospholipid; and

R_4 is O of the glycan.

[followed by page 41]

34) The method of claim 1 where when F is a peptide, S is selected from the group consisting of:



where:

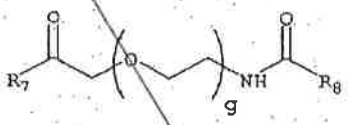
M is CH_3 or H;

c is the integer 3, 4 or 5;

d and e are independently the integer 1 or 2;

R_5 is N of the primary amino of a diacyl or dialkyl-glycerophospholipid; and

R_6 is S of the sulfhydryl of an amino acid residue of the peptide,

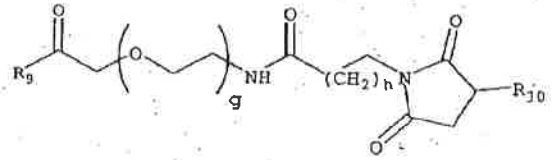


where:

g is a value in the range 6 to 14;

R_7 and R_8 are, respectively, N of the amino terminus of the peptide and N of the primary amino of a diacyl or dialkyl-glycerophospholipid or N of the primary amino of a diacyl or dialkyl-glycerophospholipid and N of the amino terminus of the peptide,

or



where:

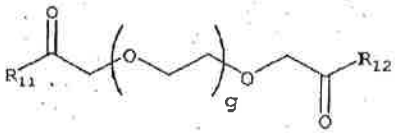
g is a value in the range 6 to 14;

h is the integer 1 or 2;

R_9 is N of the primary amino of a diacyl or dialkyl-glycerophospholipid; and

R_{10} is S of the sulfhydryl of an amino acid residue of the peptide, or

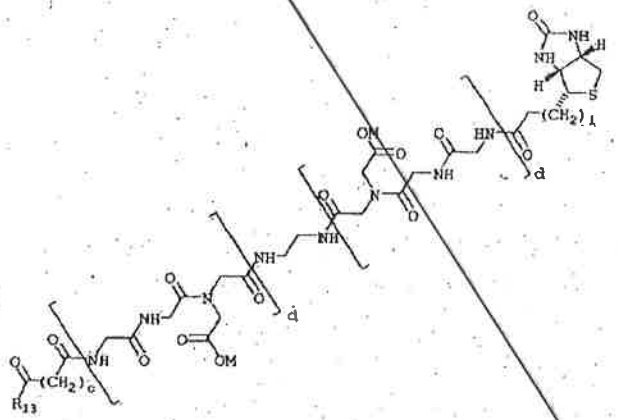
or



g is a value in the range 6 to 14;

R_{11} and R_{12} are, respectively, N of the amino terminus of the peptide and N of the primary amino of a diacyl or dialkyl-glycerophospholipid or N of the primary amino of a diacyl or dialkyl-glycerophospholipid and N of the amino terminus of the peptide.

35) The method of claim 1 where when F is a conjugator that is biotin, F-S is selected from the group consisting of:



where:

M is CH_3 or H;
c is the integer 3, 4 or 5;
d and e are independently the integer 1 or 2; and
R_{13} is N of the primary amino of a diacyl or dialkyl-glycerophospholipid.

36) A **diagnostic test card or stick, microarray or multiwell plate** fabricated using the method of any one of claims 1 to 35.

CLAIMS

1) A **method** of localising a functional moiety (F) to at least one discrete area on a surface of a substrate including the step of propelling droplets of a dispersion of a synthetic construct of the structure F-S-L from a plurality of orifices located in a monolithic print head onto the surface of the substrate where S is a spacer selected to provide a construct that is dispersible in water in the absence of organic solvents or detergents at a temperature of 25 °C and L is a diacyl- or dialkyl-glycerophospholipid.

2) The method of claim 1 where the at least one discrete area is in the shape of a symbol.

3) The method of claim 1 where the at least one discrete area is a pattern comprising a combination of indicia in which the dispersion of the synthetic construct is present at different densities.

4) The method of any one of claims 1 to 3 where the propelling droplets from a plurality of orifices is from a plurality of orifices located in the monolithic print head of an inkjet printer.

5) The method of claim 4 where the volume of each of the droplets is 1 to 100 picolitres (pL).

6) The method of claim 5 where the volume of each of the droplets is 1 to 50 pL.

7) The method of claim 6 where the volume of each of the droplets is 1 to 5 pL.

8) The method of any one of claims 1 to 7 where the concentration of the synthetic construct in the dispersion is 1 μmolar (μM) to 10 mmolar (mM).

9) The method of claim 8 where the concentration of the synthetic construct in the dispersion is 10 μM to 10 mM.

10) The method of claim 9 where the concentration of the synthetic construct in the dispersion is 0.1 to 10 mM.

11) The method of any one of claims 1 to 10 where L is a phosphatidylethanolamine.

12) The method of claim 11 where L is 1,2-O-dioleoyl-sn-glycero-3-phosphatidylethanolamine (DOPE) or 1,2-O-distearyl-sn-glycero-3-phosphatidylethanolamine (DSPE).

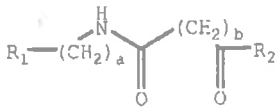
13) The method of claim 11 or 12 where F is an oligosaccharide.

14) The method of claim 11 or 12 where F is an oligopeptide.

15) The method of claim 11 or 12 where F is biotin.

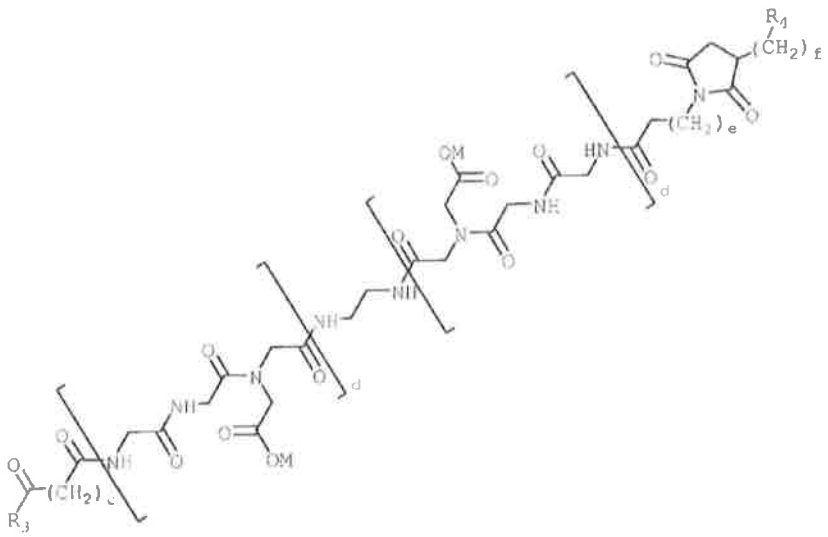
16) The method of claim 13 where S is:

(i)



where a and b are independently the integer 3, 4 or 5; and R_1 and R_2 are, respectively, O of the oligosaccharide and N of the primary amino of the phosphatidylethanolamine or N of the primary amino of the phosphatidylethanolamine and O of the oligosaccharide, or

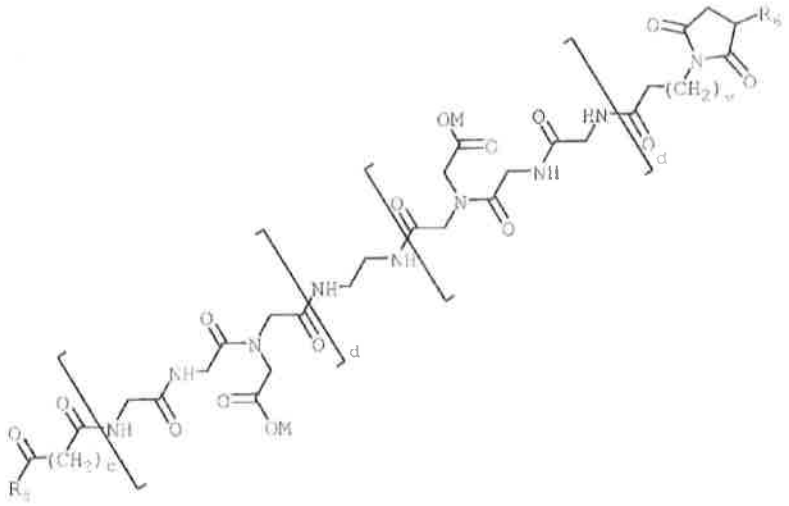
(ii)



where M is CH_3 or H; c is the integer 3, 4 or 5; d and e are independently the integer 1 or 2; f is the integer 2, 3 or 4; R_3 is N of the primary amino of the phosphatidylethanolamine; and R_4 is O of the oligosaccharide.

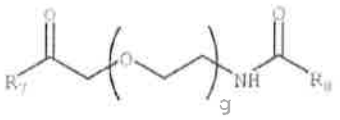
17) The method of claim 14 where S is:

(i)



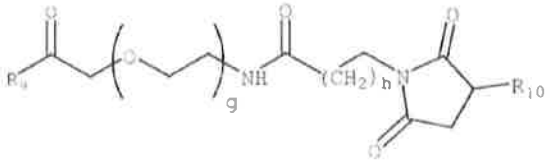
where M is CH_3 or H; c is the integer 3, 4 or 5; d and e are independently the integer 1 or 2; R_5 is N of the primary amino of the phosphatidylethanolamine; and R_6 is S of the sulfhydryl of an amino acid residue of the oligopeptide,

(ii)



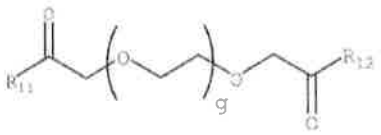
where g is a value in the range 6 to 14; R_7 and R_8 are, respectively, N of the amino terminus of the oligopeptide and N of the primary amino of the phosphatidylethanolamine, or N of the primary amino of the phosphatidylethanolamine and N of the amino terminus of the oligopeptide,

(iii)



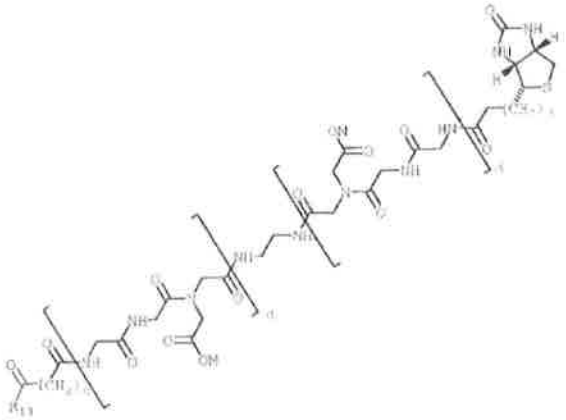
where g is a value in the range 6 to 14; h is the integer 1 or 2; R_9 is N of the primary amino of the phosphatidylethanolamine; and R_{10} is S of the sulfhydryl of an amino acid residue of the oligopeptide, or

(iv)



where g is a value in the range 6 to 14; R_{11} and R_{12} are, respectively, N of the amino terminus of the oligopeptide and N of the primary amino of the phosphatidylethanolamine, or N of the primary amino of the phosphatidylethanolamine and N of the amino terminus of the oligopeptide.

18) The method of claim 15 where F-S is:



where M is CH_3 or H; c is the integer 3, 4 or 5; d and e are independently the integer 1 or 2; and R_{13} is N of the primary amino of the phosphatidylethanolamine.

19) **A diagnostic test card or stick, microarray or multiwell plate** fabricated using the method of any one of claims 1 to 18.