

above, to give 1.4KL2. The 1.4KL2 was weighed into a 100 ml flask (8.65 g) and 270 ml of dried toluene was added. About 50 ml of toluene was distilled off to remove residual water as the azeotrope, and the solution was cooled. Then 0.858 g (825 microliter) of commercial 1,6 hexane-diisocyanate was added, and also 1 drop of dibutyltin dilaurate (ca. 0.02 g). The solution was at 60 degrees at addition, and warmed to 70 degrees over about 10 minutes. Heat was applied to maintain the solution at about 75 degrees for about 3.5 hours. NMR and IR spectra confirmed consumption of the diisocyanate, and the resulting solution was therefore expected to contain alternating PEO and hexane blocks, linked by urethane linkages, and terminated by hydroxyls. This material can be capped with reactive end groups, optionally after further extension with hydroxy acids, to form a reactive macromer. The urethane links and hexane blocks are present to promote tissue adherence.

Modifications and variations of the present invention will be obvious to those skilled in the art from the foregoing detailed description. Such modifications and variations are intended to come within the scope of the following claims.

What is claimed is:

1. A macromer which is capable of forming a gel, the macromer comprising a total of five or ten covalently linked polymeric blocks, wherein:

- a) at least one polymer block is hydrophilic and each hydrophilic polymer block individually has a water solubility of at least 1 gram/liter;
- b) at least two blocks are sufficiently hydrophobic to cause the macromer to aggregate to form micelles in an aqueous continuous phase;
- c) the macromer comprises at least one crosslinkable group;
- d) the macromer comprises at least one thermally sensitive region; and
- e) a solution of the macromer is capable of gelling or crosslinking to produce a hydrogel with a temperature dependent volume.

2. The macromer of claim 1 wherein the crosslinkable groups are separated by at least one degradable linkage capable of degrading under physiological conditions.

3. A macromer which is capable of forming a gel, the macromer comprising at least four covalently linked polymeric blocks, wherein:

- a) at least one polymer block is hydrophilic and each hydrophilic polymer block individually has a water solubility of at least 1 gram/liter;
- b) at least two blocks are sufficiently hydrophobic to cause the macromer to aggregate to form micelles in an aqueous continuous phase;
- c) the macromer comprises at least one crosslinkable group;
- d) the macromer comprises at least one thermally sensitive region;
- e) a solution of the macromer is capable of gelling or crosslinking to produce a hydrogel with a temperature dependent volume; and
- f) at least one hydrophobic block is separated from any crosslinkable group by at least one hydrophilic block.

4. A macromer which is capable of forming a gel, the macromer comprising at least four covalently linked polymeric blocks, wherein:

- a) at least one polymer block is hydrophilic and each hydrophilic polymer block individually has a water solubility of at least 1 gram/liter;

- b) at least two blocks are sufficiently hydrophobic to cause the macromer to aggregate to form micelles in an aqueous continuous phase;
- c) the macromer comprises at least one crosslinkable group;
- d) the macromer comprises at least one thermally sensitive region;
- e) a solution of the macromer is capable of gelling or crosslinking to produce a hydrogel with a temperature dependent volume; and
- f) the macromer comprises at least two chemically distinct hydrophobic blocks.

5. A solution of a macromer of claim 1, further comprising a biologically active material.

6. The macromer of claim 1 wherein the rate of release of a drug incorporated in the hydrogel is dependent upon the volume of the hydrogel.

7. The macromer of claim 1 wherein the macromer is capable of thermoreversible gelation in an aqueous solution of the macromer at a concentration of at least 2% by weight, and wherein the gelation temperature is between about 0° C. and about 65° C.

8. The macromer of claim 1 wherein the macromer has an optically anisotropic phase at a concentration at or below the maximal solubility of the macromer in an aqueous solution, at a temperature between about 0 and 65° C.

9. The macromer of claim 1, further comprising at least one ionically charged moiety covalently attached to the macromer.

10. The macromer of claim 1 wherein the macromer has a phase transition temperature in the range of 0 to 100° C., and wherein the transition temperature is affected by a property selected from the group consisting of the ionic composition of an aqueous solution of the macromer and the concentration of macromer in the aqueous solution.

11. A mixture comprising the macromer of claim 1 and a hydrophobic material non-covalently associated with the macromer.

12. The mixture of claim 11, wherein the hydrophobic material is selected from the group consisting of a hydrocarbon, a lipid, a fatty acid, and a sterol.

13. The macromer of claim 1 wherein the crosslinkable group is selected from the group consisting of an ethylenically unsaturated group, an epoxide, an isocyanate, an isothiocyanate, an aldehyde, an amine, a sulfonic acid and a carboxylic acid.

14. The macromer of claim 1 wherein the hydrophobic blocks are the same or different and are selected from the group consisting of polypropylene oxide, polybutylene oxide, hydrophobic mixed poly(alkylene oxides), and oligomers of hydroxy acids, lactones, amino acids, anhydrides, orthoesters, phosphazenes, and phosphates.

15. The macromer of claim 1 wherein the hydrophilic blocks are the same or different and are selected from the group consisting of poly(ethylene glycol), poly(ethylene oxide), poly(vinyl alcohol), poly(vinylpyrrolidone), poly(ethyloxazoline), polysaccharides and amino acid polymers.

16. The macromer of claim 2 wherein the degradable linkage groups are the same or different and are selected from the group consisting of poly(alpha-hydroxy acids), poly(amino acids), poly(anhydrides), poly(orthoesters), poly(phosphazines), poly(phosphoesters), and polylactones.

17. The macromer of claim 1 wherein at least two hydrophobic blocks are separated by a hydrophilic block.

18. The macromer of claim 1 wherein each hydrophobic block is separated by a hydrophilic block from any other hydrophobic block.