

After three 3 days incubation at 37° C., the media in the wells containing the PEG/PEG gels was found to have lightened in color (Dulbecco Modified Eagle's Media is normally red in color), indicating a pH change in the media. This indicated that the cells were alive and feeding. At 7 days incubation at 37° C., the cells were still spheroidal in morphology (indicating lack of adhesion to the gel) and the media had lightened even further, indicating that the cells were still viable and continued to feed.

On day 7, the contents of each well were placed in a 10% formalin solution for histological evaluation. According to histological evaluation, an estimated 75% of the cells in the wells containing the PEG/PEG gels appeared to be alive, but did not appear to be reproducing.

The results of the experiment indicate that HSF cells are viable in the tetra-amino PEG/tetra SE-PEG crosslinked gels, but did not seem to adhere to the gel and did not appear to reproduce while entrapped within the gel matrix. As described above, adherence or non-adherence of cells to a substrate material can influence the cells' morphology. In certain types of cells, cellular morphology can, in turn, influence certain cellular functions. Therefore, non-adherence of the cells to the PEG-PEG gel matrix may be an advantage in the delivery of particular cell types whose function is influenced by cell morphology. For example, the ability of cartilage cells to produce extracellular matrix materials is influenced by cellular morphology: when the cells are in the flattened, spindle-shaped configuration, the cells are in reproductive mode; when the cells are in the spheroidal configuration, reproduction stops, and the cells begin to produce extracellular matrix components.

Because the PEG-PEG gels are not readily degraded in vivo, the gels may be particularly useful in cell delivery applications where it is desirable that the cells remain entrapped within the matrix for extended periods of time.

What is claimed is:

1. A composition comprising a multi-nucleophilic polyalkylene oxide and a multi-electrophilic polyalkylene oxide, wherein the multi-nucleophilic polyalkylene oxide has m nucleophilic groups and the multi-electrophilic polyalkylene oxide has n electrophilic groups, wherein m and n are each greater than or equal to two, and wherein m+n is greater than or equal to five.

2. The composition of claim 1, wherein n is two, and wherein m is greater than or equal to three.

3. The composition of claim 1, wherein m is two, and wherein n is greater than or equal to three.

4. The composition of claim 2, wherein the multi-nucleophilic polyalkylene oxide is tetrafunctionally activated.

5. The composition of claim 3, wherein the multi-electrophilic polyalkylene oxide is tetrafunctionally activated.

6. The composition of claim 1, wherein both the multi-nucleophilic polyalkylene oxide and the multi-electrophilic polyalkylene oxide are tetrafunctionally activated.

7. The composition of claim 1, wherein the multi-nucleophilic polyalkylene oxide further comprises two or more nucleophilic groups selected from the group consisting of —NH₂, —SH, —H, —PH₂, and —CO—NH—NH₂.

8. The composition of claim 7, wherein the multi-nucleophilic polyalkylene oxide further comprises two or more primary amino groups.

9. The composition of claim 7, wherein the multi-nucleophilic polyalkylene oxide further comprises two or more thiol groups.

10. The composition of claim 1, wherein the multi-nucleophilic polyalkylene oxide is polyethylene glycol or a derivative thereof.

11. The composition of claim 10, wherein the polyethylene glycol further comprises two or more nucleophilic groups selected from the group consisting of a primary amino group and a thiol group.

12. The composition of claim 1, wherein the multi-electrophilic polyalkylene oxide further comprises two or more electrophilic groups selected from the group consisting of —CO₂N(COCH₂)₂, —CO₂H, —CHO, —CHOCH₂, —N=C=O, —SO₂CH=CH₂, —N(COCH)₂, and —S—S—(C₅H₄N).

13. The composition of claim 1, wherein the multi-electrophilic polyalkylene oxide further comprises two or more succinimidyl groups.

14. The composition of claim 1, wherein the multi-electrophilic polyalkylene oxide further comprises two or more maleimidyl groups.

15. The composition of claim 1, wherein the multi-electrophilic polyalkylene oxide is a polyethylene glycol or a derivative thereof.

16. A composition comprising a multi-nucleophilic polyalkylene oxide and a multi-electrophilic polyalkylene oxide, wherein the multi-nucleophilic polyalkylene oxide further comprises at least one primary amino group and at least one thiol group.

17. A composition comprising a multi-nucleophilic polyalkylene oxide and a multi-electrophilic polyalkylene oxide, wherein the multi-nucleophilic polyalkylene oxide further comprises two or more thiol groups and the multi-electrophilic polyalkylene oxide further comprises two or more electrophilic groups selected from the group consisting of succinimidyl groups and maleimidyl groups.

18. A composition comprising a multi-nucleophilic polyalkylene oxide and a multi-electrophilic polyalkylene oxide, wherein the multi-nucleophilic polyalkylene oxide further comprises two or more nucleophilic groups selected from the group consisting of primary amino groups and thiol groups, and the multi-electrophilic polyalkylene oxide further comprises two or more succinimidyl groups.

19. The composition of claim 1 further comprising a polysaccharide or a protein.

20. The composition of claim 1 further comprising a polysaccharide, wherein the polysaccharide is a glycosaminoglycan.

21. The composition of claim 20, wherein the glycosaminoglycan is selected from the group consisting of hyaluronic acid, chitin, chondroitin sulfate A, chondroitin sulfate B, chondroitin sulfate C, keratin sulfate, keratosulfate, heparin, and derivatives thereof.

22. The composition of claim 19 further comprising a protein, wherein the protein is collagen or a derivative thereof.

23. A composition comprising a first polyethylene glycol comprising two or more thiol groups, and a second polyethylene glycol comprising two or more succinimidyl groups or maleimidyl groups, wherein the sum of the thiol groups and the succinimidyl or maleimidyl groups is at least five.

24. The composition of claim 23 further comprising a protein or a polysaccharide.

25. The composition of claim 24 further comprising a polysaccharide, wherein the polysaccharide is a glycosaminoglycan.

26. The composition of claim 25, wherein the glycosaminoglycan is selected from the group consisting of hyaluronic acid, chitin, chondroitin sulfate A, chondroitin sulfate B, chondroitin sulfate C, keratin sulfate, keratosulfate, heparin, and derivatives thereof.