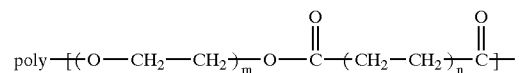


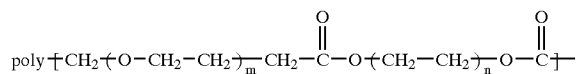
What is claimed is:

- 25 **1.** A temperature sensitive, water soluble polymer of formula (1)



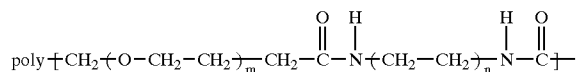
that includes a hydrophilic component and a hydrophobic component joined by a linking group wherein the hydrophilic component includes m (ethylene oxide) groups, the hydrophobic component includes n ethylene groups, and the linking group is an ester group, and where $1 \leq m \leq 30$ and $1 \leq n \leq 30$.

- 35 **2.** The polymer of claim 1 wherein m=4 and n=3.
3. The polymer of claim 1 wherein m=5 and n=3.
4. The polymer of claim 1 wherein m=13 and n=3.
40 5. The polymer of claim 1 wherein m=5 and n=5.
6. The polymer of claim 1 wherein m=13 and n=5.
7. A temperature sensitive, water soluble polyester of formula (2)



that includes a hydrophilic component and a hydrophobic component joined by a linking group wherein the hydrophilic component includes m (ethylene oxide) groups, the hydrophobic component includes n ethylene groups, and the linking group is an ester group, where $1 \leq m \leq 30$ ethylene oxide and $1 \leq n \leq 30$ ethylene.

- 50 **8.** The polymer of claim 7 wherein m=5 and n=6.
55 9. The polymer of claim 7 wherein m=13 and n=6.
10. The polymer of claim 7 wherein m=5 and n=3.
11. The polymer of claim 7 wherein m=13 and n=3.
12. A temperature sensitive, water soluble polyamide of formula (3)



65

(3)

25

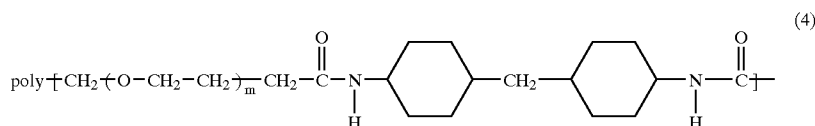
that includes a hydrophilic component and a hydrophobic component joined by a linking group wherein the hydrophilic component includes m (ethylene oxide) groups, the hydrophobic component includes n ethylene groups, and the linking group is an amide group, where $1 \leq m \leq 40$ ethylene oxide and $1 \leq n \leq 30$ ethylene.

13. The polymer of claim 12 wherein m=5 and n=5.

14. The polymer of claim 12 wherein m=13 and n=5.

15. The polymer of claim 12 wherein m=13 and n=3.

16. A temperature sensitive, water soluble polyamide of formula (4)



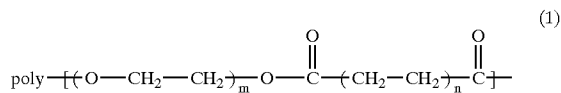
that includes a hydrophilic monomer and a hydrophobic monomer joined to a linking group wherein the hydrophilic monomer is ethylene oxide, the hydrophobic monomer is ethylene and the linking group is an amide group, where $1 \leq m \leq 40$ ethylene oxide.

17. The polymer of claim 16 wherein m=5.

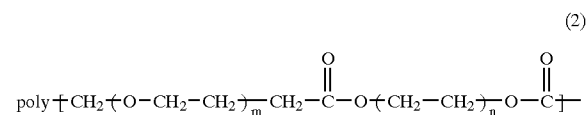
18. The polymer of claim 16 wherein m=13.

19. A substrate bearing a grafted temperature responsive polymer comprising,

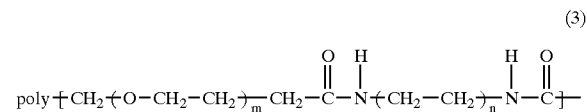
a substrate material having a self assembled monolayer thereon, and a temperature responsive polymer of any of formulae (1) to (5):



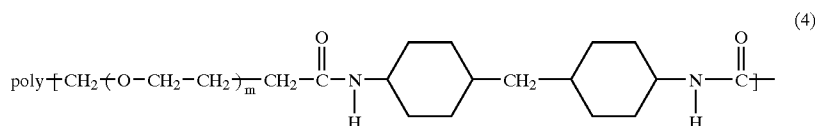
where $1 \leq m \leq 30$,



where $1 \leq m \leq 30$ ethylene oxide and $1 \leq n \leq 30$ ethylene,

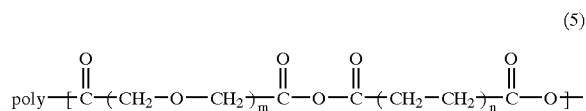


where $1 \leq m \leq 40$ ethylene oxide and $1 \leq n \leq 30$ ethylene,



26

where $1 \leq m \leq 40$ ethylene oxide, and



where m=13 and n=3.

20. The substrate of claim 19 wherein the substrate material is selected from the group consisting of metal, ceramic, metal-oxide, semiconductor, polymer, glass and silicon.

21. The substrate of claim 20 wherein the self assembled monolayer includes uniform or mixtures of α , ω -functionalized molecules, with α -functionalities selected from the group consisting of chloro-silanes, ethoxysilanes, methoxysilanes, and ω -functionalities selected from the group consisting of amino, carboxy, nitrile, cyanide, anhydride, epoxide, and hydroxy.

22. The substrate of claim 20 wherein the substrate is a novel metal and the self assembled monolayer includes molecules ω -functionalized α -thiols.

23. The substrate of claim 19 wherein the grafted polymer is that of formula (1), and wherein (m/n)=4/3.

24. The substrate of claim 23 wherein the self assembled monolayer is aminopropyltriethoxy silane.

25. The substrate of claim 19 wherein the grafted polymer is that of formula (2), and wherein (m/n)=13/3.

26. The substrate of claim 24 wherein the self assembled monolayer is aminopropyltriethoxy silane.

27. The substrate of claim 19 wherein the grafted polymer is that of formula (3), and wherein (m/n)=13/5.

28. The substrate of claim 27 wherein the self assembled monolayer is aminopropyltriethoxy silane.

29. The substrate of claim 19 wherein the grafted polymer is that of formula (4), and wherein m=13.

30. The substrate of claim 29 wherein the self assembled monolayer is aminopropyltriethoxy silane.

31. A microfluidic device having a temperature responsive polymer and a conductive fluid comprising,

27

a glass substrate bearing a grafted temperature responsive polymer thereon,

electrodes in contact the substrate so as to contain a conductive fluid therebetween, a microchannel grid in contact with the substrate whereby micro channels of the grid face the substrate and cover the electrodes to confine the conductive fluid to the microchannels,

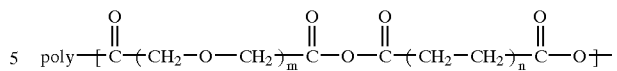
wherein the grafted polymer is that of formula (2) where m=13 and n=6.

32. The device of claim 31 wherein the conductive fluid comprises methylene blue.

33. A temperature sensitive, water soluble polymer of formula (5)

28

(5)



10 that includes a hydrophilic component and a hydrophobic component joined by a linking group wherein the hydrophilic component includes m (ethylene oxide) groups, the hydrophobic component includes n ethylene groups, and the linking group is an anhydride group, and where m=13 and n=3.

* * * * *