CLAIMS

1. A matrix, comprising a tissue adhesive layer, wherein said tissue adhesive layer comprises a blended polymeric fiber comprising:

(i) a first polymer;

(ii) a second branched polymer;

(iii) a third polymer having reactivity to the second branched polymer and is at least partially crosslinked to the second branched polymer;

wherein any one of the second and the third polymer comprises a tissue-adhesive group; and wherein at least 50mol% of the tissue adhesive groups within the blended polymeric fiber are non-crosslinked.

2. The matrix of claim 1, wherein an average molecular weight of said first polymer ranges from 10 KDa to 900 KDa.

3. The matrix of any one of claims 1 and 2, wherein said first polymer is selected from the group consisting of: a polyester, a polyanhydride, a polyacetal, a polyorthoester, a polyurethane, a polycarbonate, a polyphosphazene, a polyphosphoester, a polyether, a silicone, a polyamide, a polysulfone, a polyether ether ketone (PEEK), poly(ethylene glycol), polytetrafluoroethylene, polyethylene, a polysaccharide or any combination or a copolymer thereof.

4. The matrix of any one of claims 1 to 3, wherein said third polymer is branched.

5. The matrix of any one of claims 1 to 4, wherein said third polymer comprises a nucleophilic group, wherein the second polymer is in a molar excess relative to the third polymer within said fiber.

6. The matrix of any one of claims 1 to 5, wherein said crosslinked is by reacting the tissue-adhesive group and said nucleophilic group; and wherein said matrix is devoid of a solvent.

7. The matrix of any one of claims 1 to 6, wherein said branched is selected from the group consisting of: a star polymer, a dendrimer, and a hyperbranched polymer or any combination thereof.

8. The matrix of any one of claims 1 to 7, wherein said branched comprises three to ten arms.

9. The matrix of any one of claims 1 to 8, wherein said tissue-adhesive group is selected from the group consisting of: an activated ester, an acyl halide, a chloroformate, an anhydride, an aldehyde, an epoxide, an isocyanate, an isothiocyanate, a maleimide, a carbonate, a sulfonyl chloride, a haloacetamide, an acyl azide, an imidoester, a carbodiimide, a vinyl sulfone, ortho-pyridyl-disulfide, or any combination thereof.

10. The matrix of any one of claims 1 to 9, wherein said tissue-adhesive group is covalently bound to an arm of said second branched polymer.

11. The matrix of any one of claims 1 to 10, wherein said second branched polymer, said third polymer, or both are selected from the group consisting of: polyethers, polyesters, polydioxanones, polyphosphoesters, polyurethanes, and polyamides or any combination or a co-polymer thereof.

12. The matrix of any one of claims 1 to 11, wherein said second branched polymer, said third polymer, or both comprise polyethyleneglycol; and wherein said first polymer is selected from the group consisting of: polylactic acid, poly(L-lactic acid), poly(D-lactic acid), polyglycolic acid, , nylon and polycaprolactone or any combination or a co-polymer thereof.

13. The matrix of any one of claims 1 to 12, wherein an average molecular weight of said second branched polymer, and of said third polymer ranges from 500 Da to 100000 Da.

14. The matrix of any one of claims 1 to 13, wherein the weight ratio of said third polymer to said second branched polymer ranges from 1:1 to 1:10.

15. The matrix of claim 1, wherein the weight ratio of said first polymer to said second branched polymer ranges from 1:1 to 20:1.

16. The composition of any one of claims 1 to 15, wherein said activated ester is selected from thio-ester, a penta-fluoroalkyl ester, a penta-fluorophenol ester, and a N-hydroxysuccinimide ester.

17. The matrix of any one of claims 1 to 16, wherein said blended polymeric fiber is biodegradable; and wherein said tissue-adhesive layer consists essentially of said blended polymeric fibers.

18. The matrix of of any one of claims 1 to 17, wherein said blended polymeric fiber is characterized by an average fiber diameter of 0.5 to 10 um.

19. The matrix of claim 1, wherein said blended polymeric fiber is characterized by a melting point of 50 to 150^{o}C.

20. The matrix of any one of claims 1 to 19, further comprising an additional layer of polymeric fibers.

21. The matrix of claim 20, wherein said additional layer enhances a stability of said tissue-adhesive layer.

22. The matrix of any one of claims 1 to 21, wherein said tissue-adhesive layer is characterized by a pore size of 0.5 to 100 um.

23. The matrix of any one of claims 1 to 22, wherein said tissue-adhesive layer is characterized by a tensile strength of at least 0.05 MPa.

24. The matrix of any one of claims 1 to 23, wherein said tissue-adhesive layer is characterized by an adhesion strength of 1 to 10 N, wherein said adhesion strength is calculated by dividing a maximum force required to separate collagen strips joined by the matrix by a bonding area of the collagen strips; and wherein the maximum force is determined by stretching the collagen strips at 10 mm/min speed.

25. The matrix of any one of claims 1 to 24, wherein said tissue-adhesive layer is characterized by a porosity of at least 60 %.

26. The matrix of any one of claims 1 to 25, wherein said tissue-adhesive layer is characterized by a thickness of 0.5 to 250 um.

27. The matrix of any one of claims 1 to 26, wherein said tissue-adhesive layer is characterized by a water-permeability of less than 1 ml per hour per cm^2 upon exposure to an aqueous liquid at a pressure of 40 mmHg.

28. The matrix of any one of claims 1 to 27, further comprising a pharmaceutically active ingredient.

29. The matrix of any one of claims 1 to 28, for use in promoting (i) bioadhesion of at least one biological tissue; (ii) blood coagulation.

30. The matrix of any one of claims 1 to 29, for use in repairing and/or substituting a biological tissue.

31. A process for manufacturing the matrix of any one of claims 1 to 30, comprising: (i) mixing the first polymer the second branched polymer and the third polymer with a solvent, thereby obtaining a solution; and (ii) providing said solution into an electrospinning apparatus; thereby obtaining said blended polymeric fiber.

32. The process of claim 31, wherein said process is for manufacturing said tissue-adhesive layer.