CLAIMS

1. A composition comprising a substrate having covalently bound to the substrate a non-fouling polymeric material, wherein the polymeric material is grafted from within the substrate where present, said composition comprising a polymerization initiator imbibed into the substrate.

2. The composition of claim 1, wherein the substrate is selected from the group consisting of metallic materials, ceramics, polymers, woven materials, non-woven materials, silicon, and combinations thereof.

3. The composition of claim 1, wherein the substrate is a polymer and the substrate polymer is polyurethane or a polycarbonate-based polyurethane.

4. The composition of any of claims 1-3, wherein the surface of the substrate comprises an undercoating layer to form a surface having a uniform chemical composition.

5. The composition of claim 4, wherein the undercoating layer is a polyurethane.

6. The composition of any of claims 1-5, wherein the non-fouling polymeric material is a zwitterionic polymer.

7. The composition of any of claims 1-5, wherein the non-fouling polymeric material is a homopolymer of or copolymer comprising sulfobetaine methacrylate (SBMA) or sulfobetaine acrylamide.

8. The composition of any of claims 1-5, wherein the non-fouling material is a non-zwitterionic polymer selected from the group consisting of polyethers, polysaccharides, polyvinylpyrrolidone, hydroxyethyl-methacrylate, acrylanitrile-acrylamide copolymers, heparin, mixed charge polymers, and polymers containing hydrogen bond accepting groups.

9. The composition of any of claims 1-8, wherein the non-fouling polymeric material, the substrate, the undercoating layer, or combinations thereof has immobilized thereon one or more bioactive agents.

10. The composition of any of claims 1-9, wherein the composition is in the form of a medial device.

11. The composition of claim 10, wherein the medical device is selected from the group consisting of fibers; surgical, medical or dental instruments; blood oxygenators, ventilators, pumps, drug delivery devices, tubing, wiring, electrodes, contraceptive devices, feminine hygiene products, endoscopes, grafts, stents, stent grafts, pacemakers, implantable cardioverter-defibrillators, cardiac resynchronization therapy devices, cardiovascular device leads, ventricular assist devices and drivelines, heart valves, vena

cava filters, endovascular coils, catheters, catheter connectors and valves, intravenous delivery lines and manifolds, shunts, wound drains, dialysis membranes, infusion ports, cochlear implants, endotracheal tubes, tracheostomy tubes, ventilator breathing tubes and circuits, guide wires, fluid collection bags, drug delivery bags and tubing, implantable sensors, ophthalmic devices, orthopedic devices, dental implants, periodontal implants, breast implants, penile implants, maxillofacial implants, cosmetic implants, valves, appliances, scaffolding, suturing material, needles, hernia repair meshes, tension-free vaginal tape and vaginal slings, prosthetic neurological devices, tissue regeneration or cell culture devices, or other medical devices used within or in contact with the body.

12. A method of making the composition of claim 1, the process comprising imbibing a radical initiator or a member of a redox initiator system into the substrate and grafting a non-fouling polymeric material from the substrate by radical polymerization.

13. The method of claim 12, wherein an ultraviolet (UV) initiator is incorporated into the substrate, the undercoating layer, or both.

14. The method of claim 12, wherein a member of a redox initiator system is incorporated into the substrate, the undercoating layer, or both, the redox initiator system comprising an oxidant and a reducing agent.

15. The method of claim 14, wherein the redox initiator system comprises a hydrophobic-hydrophilic redox initiator pair.

16. The method of claim 15, wherein the redox initiator system comprises a peroxide and a metal salt.

17. The method of claim 16, wherein the peroxide is dicumyl peroxide and the metal salt is Fe(II) gluconate.

18. The method of any of claims 12-17, wherein the graft-from polymerization occurs in the presence of one or more oxygen scavengers.

CLAIMS

1. A composition comprising a substrate having covalently bound to the substrate a non-fouling polymeric material, wherein the polymeric material is grafted from within the substrate, said composition comprising a polymerization initiator imbibed into the substrate.

2. The composition of claim 1, wherein the substrate is selected from the group consisting of metallic materials, ceramics, polymers, woven materials, non-woven materials, silicon, and combinations thereof.

3. The composition of claim 1, wherein the substrate is a polymer and the substrate polymer is polyurethane or a polycarbonate-based polyurethane.

4. The composition of any of claims 1-3, wherein the surface of the substrate comprises an undercoating layer to form a surface having a uniform chemical composition.

5. The composition of claim 4, wherein the undercoating layer is a polyurethane.

6. The composition of any of claims 1-5, wherein the non-fouling polymeric material is a zwitterionic polymer.

7. The composition of any of claims 1-5, wherein the non-fouling polymeric material is a homopolymer of or copolymer comprising sulfobetaine methacrylate (SBMA) or sulfobetaine acrylamide.

8. The composition of any of claims 1-5, wherein the non-fouling material is a non-zwitterionic polymer selected from the group consisting of polyethers, polysaccharides, polyvinylpyrrolidone, hydroxyethyl-methacrylate, acrylanitrile-acrylamide copolymers, heparin, mixed charge polymers, and polymers containing hydrogen bond accepting groups.

9. The composition of any of claims 1-8, wherein the non-fouling polymeric material, the substrate, the undercoating layer, or combinations thereof has immobilized thereon one or more bioactive agents.

10. The composition of any of claims 1-9, wherein the composition is in the form of a medical device.

11. The composition of claim 10, wherein the medical device is selected from the group consisting of fibers; surgical, medical or dental instruments; blood oxygenators, ventilators, pumps, drug delivery devices, tubing, wiring, electrodes, contraceptive devices, feminine hygiene products, endoscopes, grafts, stents, stent grafts, pacemakers, implantable cardioverter-defibrillators, cardiac resynchronization therapy devices, cardiovascular device leads, ventricular assist devices and drivelines, heart valves, vena

cava filters, endovascular coils, catheters, catheter connectors and valves, intravenous delivery lines and manifolds, shunts, wound drains, dialysis membranes, infusion ports, cochlear implants, endotracheal tubes, tracheostomy tubes, ventilator breathing tubes and circuits, guide wires, fluid collection bags, drug delivery bags and tubing, implantable sensors, ophthalmic devices, orthopedic devices, dental implants, periodontal implants, breast implants, penile implants, maxillofacial implants, cosmetic implants, valves, appliances, scaffolding, suturing material, needles, hernia repair meshes, tension-free vaginal tape and vaginal slings, prosthetic neurological devices, tissue regeneration or cell culture devices, or other medical devices used within or in contact with the body.

12. A method of making the composition of claim 1, the process comprising imbibing a radical initiator or a member of a redox initiator system into the substrate and grafting a non-fouling polymeric material from the substrate by radical polymerization.

13. The method of claim 12, wherein an ultraviolet (UV) initiator is incorporated into the substrate, the undercoating layer, or both.

14. The method of claim 12, wherein a member of a redox initiator system is incorporated into the substrate, the undercoating layer, or both, the redox initiator system comprising an oxidant and a reducing agent.

15. The method of claim 14, wherein the redox initiator system comprises a hydrophobic-hydrophilic redox initiator pair.

16. The method of claim 15, wherein the redox initiator system comprises a peroxide and a metal salt.

17. The method of claim 16, wherein the peroxide is dicumyl peroxide and the metal salt is Fe(II) gluconate.

18. The method of any of claims 12-17, wherein the graft-from polymerization occurs in the presence of one or more oxygen scavengers.