

What is claimed:

1. A block copolymer (BCP) film, comprising at least one block copolymer and at least one high molecular weight hydrophilic polymer, wherein at least a portion of the pores are isoporous and mesoporous.
2. A block copolymer (BCP) film, comprising at least one block copolymer comprising at least one hydrophilic block and at least one high molecular weight hydrophilic polymer, wherein at least a portion of the pores are isoporous and mesoporous.
3. The isoporous BCP film of claim 1, wherein the film is either symmetric or asymmetric.
4. The isoporous BCP film of claim 1, wherein the film exhibits a reduced flux decline over time.
5. The isoporous BCP film of claim 1, wherein the high molecular weight hydrophilic polymer comprises: a poly(acrylate), poly(methacrylate), poly(acrylic acid), poly(acrylamide), poly(vinylpyridine), poly(vinylpyrrolidone), poly(vinyl alcohol), naturally-derived polymer (including but not limited to cellulose, chitosan, complex carbohydrates), poly(ether), poly(maleic anhydride), poly(styrene sulfonate), poly(allylamine hydrochloride), poly(sulfone), poly(ethersulfone), poly(ethylene glycol), or substituted equivalent of the above.
6. The isoporous BCP film of claim 1, wherein the high molecular weight hydrophilic polymer is present at a range of 0.1% to 15% by weight relative to the BCP.
7. The isoporous BCP film of claim 1, wherein the isoporous BCP film exhibits reduced

protein adsorption.

8. The isoporous BCP film of claim 1, wherein the film exhibits increased flux retention upon drying after exposure to a humectant (e.g. glycerol) solution.
9. The isoporous BCP film of claim 1, wherein the high molecular weight hydrophilic polymer is poly(vinylpyrrolidone) and the average molecular weight of the poly(vinylpyrrolidone) is 360,000 Da.
10. The isoporous BCP film of claim 1, wherein the material is used for a separation or filtration application.
11. The isoporous BCP film of claim 1, wherein the material is packaged as a filter device, including but not limited to: a syringe filter, capsule, cartridge, flat sheet, spiral wound, or hollow fiber.
12. The isoporous BCP film of claim 1, wherein at least one BCP is an AB or ABC triblock copolymer.
13. A method for forming an isoporous mesoporous block copolymer (BCP) film, wherein at least a portion of the pores are isoporous and mesoporous, comprising the steps of:
 - (a) formulating a polymer solution by mixing at least one block copolymer with at least one solvent and at least one high molecular weight hydrophilic polymer;
 - (b) forming the polymer solution into a film;
 - (c) evaporating a portion of the solvent(s);
 - (d) immersing the film into a coagulation bath; and

(e) optionally, rinsing the BCP film with water.

14. A method for forming an isoporous mesoporous block copolymer (BCP) film, wherein at least a portion of the pores are isoporous and mesoporous, comprising the steps of:

- (a) formulating a polymer solution by mixing at least one block copolymer, wherein at least one BCP comprises a hydrophilic block, with at least one solvent and at least one high molecular weight hydrophilic polymer;
- (b) forming the polymer solution into a film;
- (c) evaporating a portion of the solvent(s);
- (d) immersing the film into a coagulation bath; and
- (e) optionally, rinsing the BCP film with water.

15. The method of claim 13, wherein at least one block copolymer has at least one block comprising:

Poly(butadiene), Poly(isobutylene), Poly(isoprene), Poly(ethylene), Poly(styrene), Poly(methyl acrylate), Poly(butyl methacrylate), Poly(ethersulfone), Poly(methyl methacrylate), Poly(n-butyl acrylate), Poly(2-hydroxyethyl methacrylate), Poly(glycidyl methacrylate), Poly(acrylic acid), Poly(acrylamide), Poly(sulfone), Poly(vinylidene fluoride), Poly(N,N-dimethylacrylamide), Poly(2-vinylpyridine), Poly(3-vinylpyridine), Poly(4-vinylpyridine), Poly(ethylene glycol), Poly(propylene glycol), Poly(vinyl chloride), Poly(tetrafluoroethylene), Poly(ethylene oxide), Poly(propylene oxide), Poly(N-isopropylacrylamide), Poly(dimethylaminoethyl methacrylate), Poly(amic acid),

Poly(dimethylsiloxane), Poly(lactic acid), Poly(isocyanate), Poly(ethyl cyanoacrylate), Poly(acrylonitrile), Poly(hydroxystyrene), Poly(methylstyrene), Poly(ethyleneimine), Poly(styrene sulfonate), Poly(allylamine hydrochloride), Poly(pentafluorostyrene), Poly(2-(perfluorohexyl)ethyl methacrylate), or a substituted equivalent of the above.

16. The method of claim 13, wherein the solvent comprises at least one of:

- a. Acetaldehyde,
- b. Acetic acid,
- c. Acetone,
- d. Acetonitrile,
- e. Benzene,
- f. Chloroform,
- g. Cyclohexane,
- h. Dichloromethane,
- i. Dimethoxyethane,
- j. Dimethyl sulfoxide,
- k. Dimethylacetamide,
- l. Dimethylformamide,
- m. 1,4-Dioxane,
- n. Ethanol,
- o. Ethyl acetate,
- p. Formic acid
- q. Hexane,
- r. Methanol,

- s. N-Methyl-2-pyrrolidone,
- t. Propanol
- u. Pyridine,
- v. Sulfolane,
- w. Tetrahydrofuran, or
- x. Toluene

17. The method of claim 13, wherein the film is formed on a substrate.
18. The method of claim 13, wherein the high molecular weight hydrophilic polymer comprises: a poly(acrylate), poly(methacrylate), poly(acrylic acid), poly(acrylamide), poly(vinylpyridine), poly(vinylpyrrolidone), poly(vinyl alcohol), naturally-derived polymer (including but not limited to cellulose, chitosan, complex carbohydrates), poly(ether), poly(maleic anhydride), poly(styrene sulfonate), poly(allylamine hydrochloride), poly(sulfone), poly(ethersulfone), poly(ethylene glycol), or substituted equivalent of the above.
19. The method of claim 13, wherein the high molecular weight hydrophilic polymer is present at a range of 0.1% to 15% by mass relative to the BCP.
20. The method of claim 13, wherein the block copolymer is present at a range of about 5% to 25% by weight.