CLAIMS:

1. A self-wetting porous membrane comprising an aromatic hydrophobic polymer and a wetting agent comprising a copolymer of formula A-B-A,
wherein A is a hydrophilic segment comprising a polymerized monomer or mixture of monomers, wherein the monomer is of the formula (I):

$$CH_2=C(R^1)(R^2) \quad (I),$$

wherein R^1 is hydrogen or alkyl, and R^2 is selected from substituted or unsubstituted heteroaryl, formylamino, formylaminoalkyl, aminocarbonyl, alkylcarbonyloxy, and aminocarbonylalkyl substituted with a zwitterionic group,

and B is polyethersulfone, wherein segments B and A are linked through an oxygen atom.

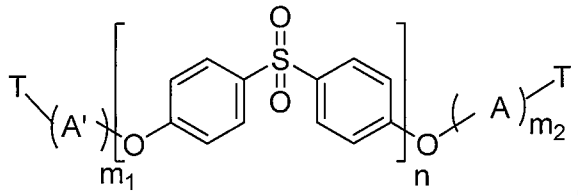
2. The self-wetting porous membrane of claim 1, wherein R^1 is hydrogen or methyl, and R^2 is selected from pyridinyl, imidazolyl, N-methylimidazolyl, formylamino, formylaminomethyl, aminocarbonyl, methylcarbonyloxy, and aminocarbonylpropyl substituted with a zwitterionic group.

3. The self-wetting porous membrane of claim 1 or 2, wherein the monomer of A is selected from N-[3-(dimethylamino)propyl]methacrylamide, vinyl acetate, 1-vinylimidazole, 1-vinyl-3-methylimidazole, 1-vinyl-2-pyridine, 1-vinyl-4-pyridine, acrylamide, N-vinylformamide, N-allylformamide, and 3-(methacrylamidopropyl)dimethyl(3-sulfopropyl)ammonium inner salt.

4. The self-wetting porous membrane of any one of claims 1-3, wherein the aromatic hydrophobic polymer is selected from polysulfone, polyethersulfone, polyphenylene ether, polyphenylene ether sulfone, polyphenylene oxide, polycarbonate, poly(phthalazinone ether sulfone ketone), polyether ketone, polyether ether ketone, polyether ketone ketone, polyimide, polyetherimide, and polyamide-imide.

5. The self-wetting porous membrane of any one of claims 1-4, wherein the aromatic hydrophobic polymer is polysulfone or polyethersulfone.

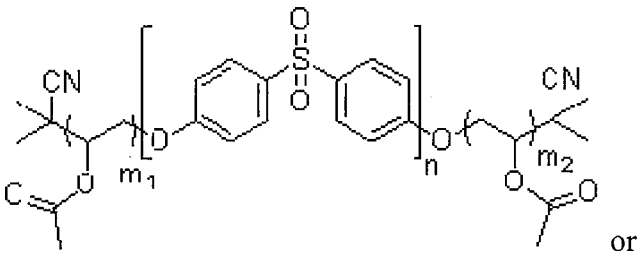
6. The self-wetting porous membrane of any one of claims 3-5, wherein the copolymer is of the formula (Ia):



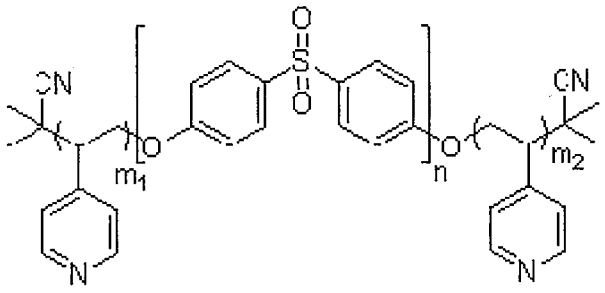
(Ia),

wherein A is the hydrophilic monomer, and Y is chloro or fluoro; wherein m_1 or m_2 is from 5 to 80; n is from 20 to 200; and T is an end group selected from 2-methylpropionitrile, benzoate, acetate, laurate, t-butyloxy, and cumyloxy.

7. The self-wetting porous membrane of any one of claims 3-6, wherein the copolymer is of the formula:



or



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wherein m_1 or m_2 is from 5 to 80 and n is from 20 to 200.

8. A method of preparing a self-wetting porous membrane comprising:

(i) casting a solution comprising a solvent, an aromatic hydrophobic polymer, and a copolymer of formula A-B-A, wherein A is a hydrophilic segment comprising a polymerized monomer or mixture of monomers, wherein the monomer is of the formula (I):

$$CH_2=C(R^1)(R^2) \quad (I),$$

wherein R^1 is hydrogen or alkyl, and R^2 is selected from substituted or unsubstituted heteroaryl, formylamino, formylaminoalkyl, aminocarbonyl, alkylcarbonyloxy, and aminocarbonylalkyl substituted with a zwitterionic group,

and B is polyethersulfone, wherein segments B and A are linked through an oxygen atom, to a desired shape;

(ii) subjecting the cast solution to phase inversion to form the self-wetting porous membrane; and

(iii) optionally rinsing the self-wetting porous membrane with water.

9. The method of claim 8, wherein R^1 is hydrogen or methyl, and R^2 is selected from pyridinyl, imidazolyl, N-methylimidazolyl, formylamino, formylaminomethyl, aminocarbonyl, methylcarbonyloxy, and aminocarbonylpropyl substituted with a zwitterionic group.

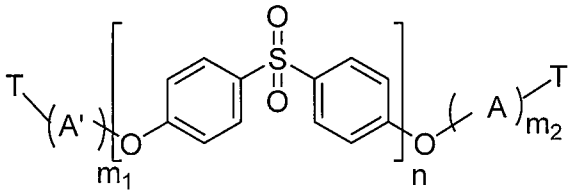
10. The method of claim 8 or 9, wherein the monomer of A is selected from N-[3-(dimethylamino)propyl]methacrylamide, vinyl acetate, 1-vinylimidazole, 1-vinyl-3-methylimidazole, 1-vinyl-2-pyridine, 1-vinyl-4-pyridine, acrylamide, N-vinylformamide, and N-allylformamide, and 3-(methacrylamidopropyl)dimethyl(3-sulfopropyl)ammonium inner salt.

11. The method of any one of claims 8-10, wherein the aromatic hydrophobic polymeric segment B is polyethersulfone.

12. The method of any one of claims 8-11, wherein the aromatic hydrophobic polymer is selected from polysulfone, polyethersulfone, polyphenylene ether, polyphenylene ether sulfone, polyphenylene oxide, polycarbonate, poly(phthalazinone ether sulfone ketone), polyether ketone, polyether ether ketone, polyether ketone ketone, polyimide, polyetherimide, and polyamide-imide.

13. The method of any one of claims 8-12, wherein the aromatic hydrophobic polymer is polysulfone or polyethersulfone.

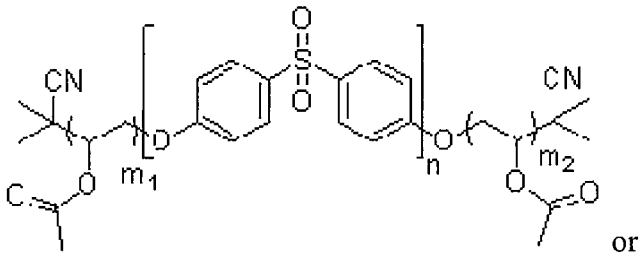
14. The method of any one of claims 10-12, wherein the copolymer is of the formula (Ia):



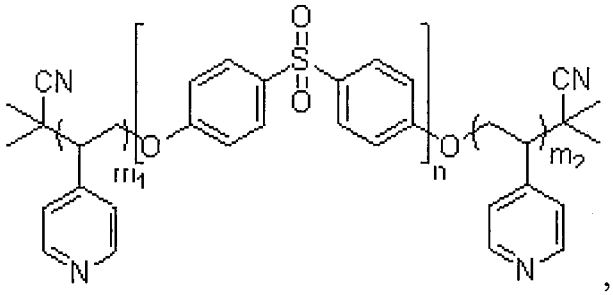
(Ia),

wherein A is the hydrophilic monomer, and Y is chloro or fluoro; wherein m_1 or m_2 is from 5 to 80; n is from 20 to 200; and T is an end group selected from 2-methylpropionitrile, benzoate, acetate, laurate, t-butyloxy, and cumyloxy.

15. The method of any one of claims 10-14, wherein the copolymer is of the formula:



or



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wherein m_1 or m_2 is from 5 to 80 and n is from 20 to 200.

16. A method of filtering a fluid, the method comprising passing the fluid through the self-wetting porous membrane of any one of claims 1-7.