CLAIMS:

1. A self-wetting porous membrane comprising an aromatic hydrophobic polymer and a wetting agent comprising a copolymer of formula A-B or 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 heterocyclyl, substituted or unsubstituted heteroaryl, formylamino, formylaminoalkyl, aminocarbonyl, alkylcarbonyloxy, and aminocarbonylalkyl substituted with a zwitterionic group,

and B is an aromatic hydrophobic polymeric segment, wherein segments B and A are linked through an amidoalkylthio group.

2. The self-wetting porous membrane of claim 1, wherein R^1 is hydrogen or methyl, and R^2 is selected from pyrrolidinonyl, 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 1-vinylpyrrolid-2-one, 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.

4. The self-wetting porous membrane of any one of claims 1-3, wherein the aromatic hydrophobic polymeric segment B is selected from polysulfone, polyethersulfone, polyphenyl ether, polyphenylene ether sulfone, polyphenylene oxide, polyether ether ketone, polyether ketone ketone, and polyetherimide.

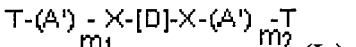
5. The self-wetting porous membrane of any one of claims 1-4, wherein the aromatic hydrophobic polymeric segment B is polysulfone.

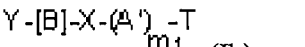
6. The self-wetting porous membrane of any one of claims 1-5, wherein the aromatic hydrophobic polymer is selected from polysulfone, polyethersulfone, polyphenyl ether, polyphenylene ether sulfone, polyphenylene oxide, polycarbonate, poly(phthalazinone ether sulfone

ketone), polyether ketone, polyether ether ketone, polyether ketone ketone, polyimide, polyetherimide, and polyamide-imide.

7. The self-wetting porous membrane of any one of claims 1-6, wherein the aromatic hydrophobic polymer is polysulfone or polyethersulfone.

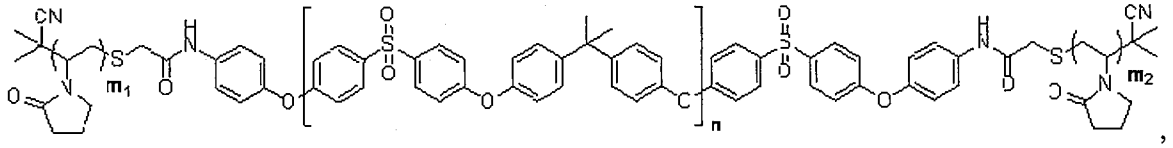
8. The self-wetting porous membrane of any one of claims 1-7, the copolymer is of the formula (Ia) or (Ib):

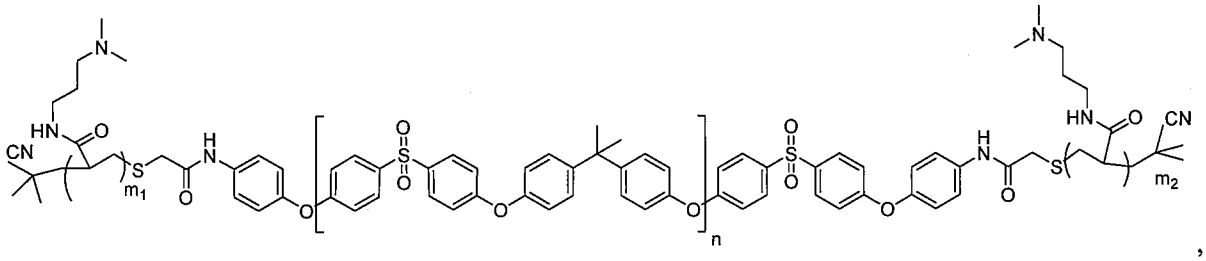

(Ia),

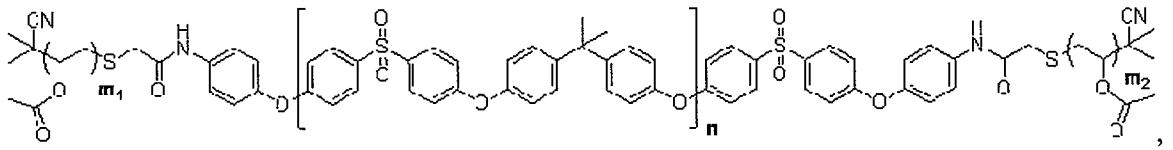

(Ib)

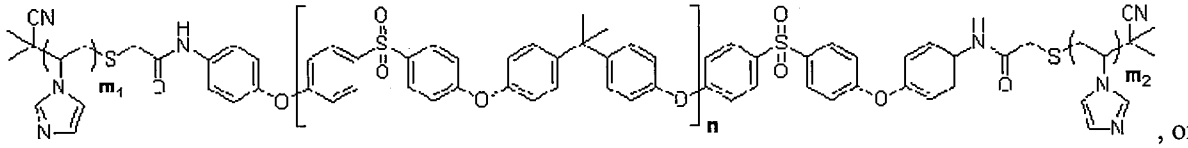
wherein B is the aromatic hydrophobic polymeric segment, A' is a repeating unit of the hydrophilic monomer, X is $-NHC(=O)(CH_2)_pS-$, wherein p is 1-3, T is an end group selected from the group consisting of 2-methylpropionitrile, benzoate, acetate, laurate, t-butyloxy, and cumyloxy, and Y is an alkyl, alkoxy, chloro, or hydroxy group; wherein m_1 or m_2 is from 5 to 50.

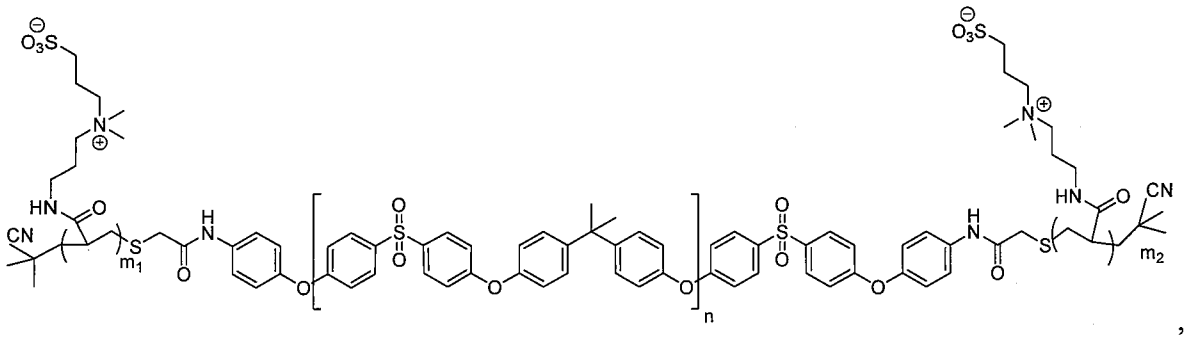
9. The self-wetting porous membrane of any one of claims 1-8, wherein the copolymer is of the formula:


,


,


,


, or



wherein m_1 or m_2 is from 5 to 50 and n is from 20 to 200.

10. 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 or 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 heterocyclyl, substituted or unsubstituted heteroaryl, formylamino, formylaminoalkyl, aminocarbonyl, alkylcarbonyloxy, and aminocarbonylalkyl substituted with a zwitterionic group,

and B is an aromatic hydrophobic polymeric segment, wherein segments B and A are linked through an amidoalkylthio group, 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.

11. The method of claim 10, wherein R^1 is hydrogen or methyl, and R^2 is selected from pyrrolidinonyl, pyridinyl, imidazolyl, N-methylimidazolyl, formylamino, formylaminomethyl, aminocarbonyl, methylcarbonyloxy, and aminocarbonylpropyl substituted with a zwitterionic group.

12. The method of claim 10 or 11, wherein the monomer of A is selected from 1-vinylpyrrolid-2-one, 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.

13. The method of any one of claims 10-12, wherein the aromatic hydrophobic polymeric segment B of the copolymer is selected from polysulfone, polyethersulfone, polyphenyl ether,

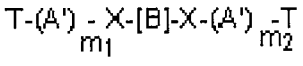
polyphenylene ether sulfone, polyphenylene oxide, polyether ether ketone, polyphenyl sulfide, and polyetherimide.

14. The method of any one of claims 10-12, wherein the aromatic hydrophobic polymeric segment B of the copolymer is polysulfone.

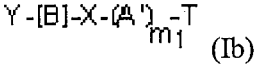
15. The method of any one of claims 10-14, wherein the aromatic hydrophobic polymer is selected from polysulfone, polyethersulfone, polyphenylene ether, polyphenylene ether sulfone, polyphenylene oxide, polycarbonate, poly(phthalazinone ether sulfone ketone), polyether ketone, polyether ether ketone, polyether ketone ketone, polyimide, polyetherimide, and polyamide-imide.

16. The method of any one of claims 10-15, wherein the aromatic hydrophobic polymer is polysulfone or polyethersulfone.

17. The method of any one of claims 10-16, wherein the copolymer is of the formula (Ia) or (Ib):



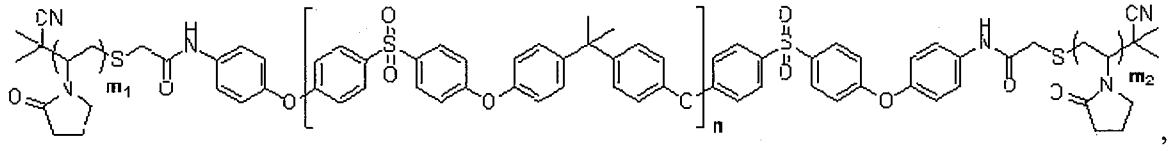
(Ia),



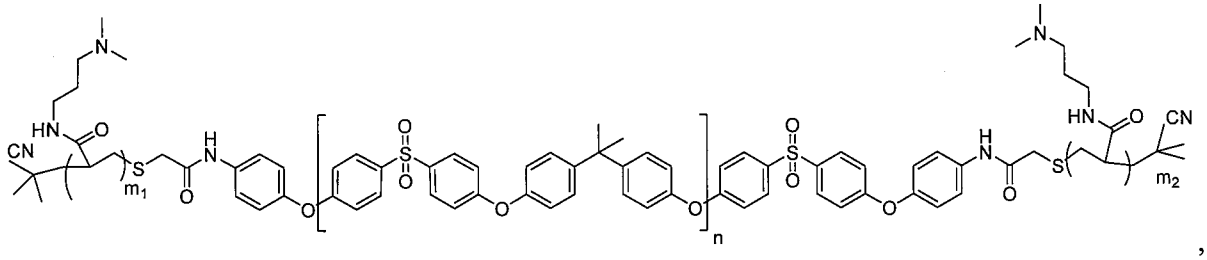
(Ib)

wherein B is the aromatic hydrophobic polymeric segment, A' is a repeating unit of the hydrophilic monomer, X is $-NHC(=O)(CH_2)_pS-$, wherein p is 1-3, T is an end group selected from the group consisting of 2-methylpropionitrile, benzoate, acetate, laurate, t-butyloxy, and cumyloxy, and Y is an alkyl, alkoxy, chloro, or hydroxy group; wherein m_1 or m_2 is from 5 to 50.

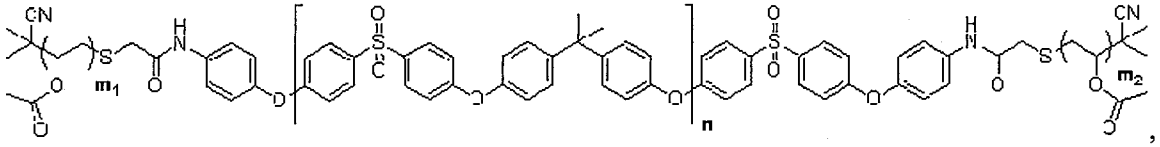
18. The method of any one of claims 10-17, wherein the copolymer is of the formula:



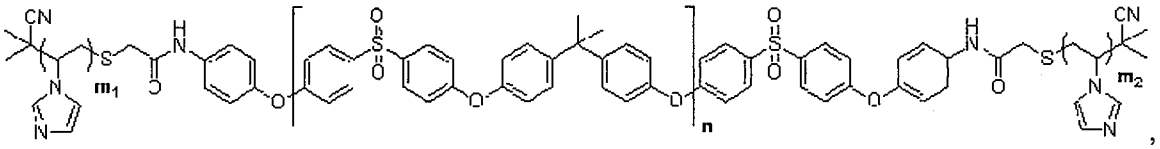
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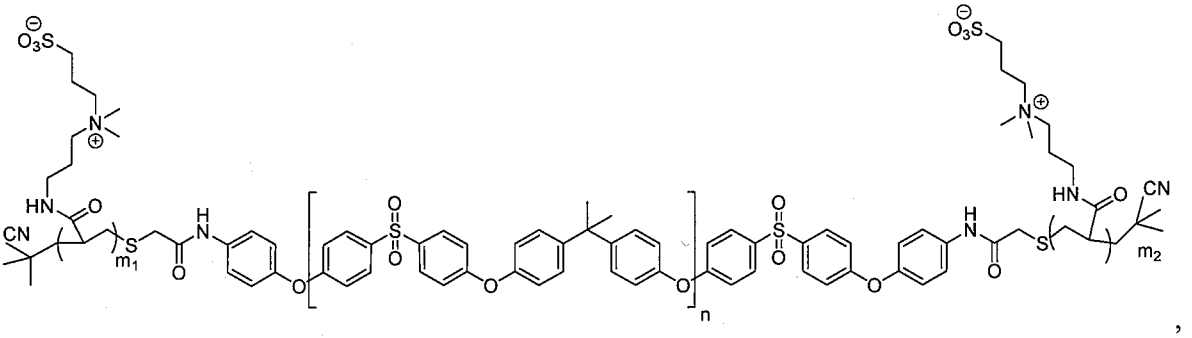
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, or



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wherein m_1 or m_2 is from 5 to 50 and n is from 20 to 200.

19. A self-wetting porous membrane prepared by the method of any one of claims 10-18.

20. A method of filtering a fluid, the method comprising passing the fluid through the self-wetting porous membrane of any one of claims 1-9 or claim 19.