Claims

[Claim 1]

A porous membrane comprising a hydrophobic polymer and a hydrophilic polymer, wherein

an average value T of ratios of the number of counts of ions derived from the hydrophilic polymer to the number of counts of ions derived from the hydrophobic polymer is 1.0 or more when a surface of the porous membrane is measured by time-of-flight secondary ion mass spectrometry (TOF-SIMS), wherein

the ion derived from the hydrophobic polymer is C_6H_4O (m/z = 92),

the ion derived from the hydrophilic polymer is $C_4H_5O_2$ (m/z = 85),

the hydrophilic polymer is a methacrylate-based polymer,

the hydrophobic polymer is a polysulfone-based polymer, and

a base material membrane comprising the hydrophobic polymer is coated with the hydrophilic polymer.

~~[Claim 2]~~

~~The porous membrane according to claim 1, wherein the ion derived from the hydrophobic polymer is C_6H_4O (m/z = 92).~~

~~[Claim 3]~~

~~The porous membrane according to claim 1 or 2, wherein the ion derived from the hydrophilic polymer is $C_4H_5O_2$ (m/z = 85).~~

[Claim 24]

The porous membrane according to ~~any one of~~ claim~~s~~ 1~~ to 3~~, wherein the hydrophilic polymer is a water-insoluble hydrophilic polymer.

[Claim 35]

The porous membrane according to ~~any one of~~ claim~~s~~ 1 or 2~~to 4~~, wherein the hydrophilic polymer is electrically neutral.

~~[Claim 6]~~

~~The porous membrane according to any one of claims 1 to 5, wherein the hydrophilic polymer is a methacrylate-based polymer.~~

[Claim 47]

The porous membrane according to any one of claims 1-3~~ 6~~, wherein the methacrylate-based polymer is polyhydroxyethyl methacrylate.

~~[Claim 8]~~

~~The porous membrane according to any one of claims 1 to 7, wherein the hydrophobic polymer is a polysulfone-based polymer.~~

[Claim 59]

The porous membrane according to any one of claims 1-4~~ 8~~, wherein the polysulfone-based polymer is polyethersulfone.

[Claim 6~~10~~]

The porous membrane according to any one of claims 1 to 5~~9~~, wherein a bubble point is 1.4 to 2.0 MPa.

[Claim 7~~11~~]

The porous membrane according to any one of claims 1 to 6~~10~~, wherein a pure water permeability is 150 to 500 L/(hr·m^2·bar).

[Claim 8~~12~~]

The porous membrane according to any one of claims 1 to 7~~11~~, for removing viruses.

[Claim 9~~13~~]

The porous membrane according to any one of claims 1 to 8~~12~~, wherein a viral log reduction value (LRV) is 4 or more.

~~[Claim 14]~~

~~The porous membrane according to any one of claims 1 to 13, wherein a base material membrane comprising the hydrophobic polymer is coated with the hydrophilic polymer.~~

[Claim 10~~15~~]

The porous membrane according to any one of claims 1 to 9~~14~~, wherein a content of the hydrophilic polymer is 5 to 20 wt% with respect to the hydrophobic polymer.

[Claim 11]

The porous membrane according to any one of claims 1 to 10, wherein the average value T is 1.0 or more and 7.0 or less.

[Claim 12~~16~~]

A method for producing a porous membrane comprising a hydrophobic polymer and a hydrophilic polymer, the method comprising:

a hydrophilization process of coating and hydrophilizing a base material membrane comprising a hydrophobic polymer with a hydrophilic polymer to obtain a hydrophilized porous membrane; and

an adjustment process of treating the hydrophilized porous membrane so that an average value T of ratios of the number of counts of ions derived from the hydrophilic polymer to the number of counts of ions derived from the hydrophobic polymer is 1.0 or more when a surface of the porous membrane is measured by time-of-flight secondary ion mass spectrometry (TOF-SIMS), wherein

the ion derived from the hydrophobic polymer is C_6H_4O (m/z = 92),

the ion derived from the hydrophilic polymer is $C_4H_5O_2$ (m/z = 85),

the hydrophilic polymer is a methacrylate-based polymer,

the hydrophobic polymer is a polysulfone-based polymer, and

the adjustment process comprises subjecting the hydrophilized porous membrane to washing and/or high-pressure hot-water treatment.

[Claim 13~~17~~]

A method for reducing membrane adhesion after hydrophilizing a base material membrane comprising a hydrophobic polymer, the method comprising:

a hydrophilization process of coating and hydrophilizing a base material membrane comprising a hydrophobic polymer with a hydrophilic polymer to obtain a hydrophilized porous membrane; and

an adjustment process of treating the hydrophilized porous membrane so that an average value T of ratios of the number of counts of ions derived from the hydrophilic polymer to the number of counts of ions derived from the hydrophobic polymer is 1.0 or more when a surface of the porous membrane is measured by time-of-flight secondary ion mass spectrometry (TOF-SIMS), wherein

the ion derived from the hydrophobic polymer is C_6H_4O (m/z = 92),

the ion derived from the hydrophilic polymer is $C_4H_5O_2$ (m/z = 85),

the hydrophilic polymer is a methacrylate-based polymer,

the hydrophobic polymer is a polysulfone-based polymer, and

the adjustment process comprises subjecting the hydrophilized porous membrane to washing and/or high-pressure hot-water treatment.

~~[Claim 18]~~

~~The method according to claim 16 or 17, wherein the adjustment process comprises subjecting the hydrophilized porous membrane to washing and/or high-pressure hot-water treatment.~~

[Claim 14~~19~~]

The method according to any one of claim~~s~~ 12 or 13~~16 to 18~~, wherein the hydrophilization process comprises a process of making the base material membrane into a bundle and performing hydrophilization treatment.