Claims

Claim 1. A porous membrane having a porous structure, wherein

when a fractal dimension is calculated under a plurality of conditions including at least six or more conditions,

the fractal dimension is being to be calculated from image data obtained by photographing a porous structure on a cut section formed by cutting the porous membrane on a discretionary section in which at least the porous structure is observed,

at a discretionary photographing position, which includes sectional outer peripheral portion, sectional central portion, and sectional inner peripheral portion of the cut section, and a discretionary photographing magnifications of 300 to 10000 at which at least the porous structure of the membrane section is observed,

all of the fractal dimensions calculated under each of the plurality of conditions are 1.5 or more and 1.9 or less,

a difference between a maximum value and a minimum value of the fractal dimensions calculated under each of the plurality of conditions is 0.1 or less,

a coefficient of variation (CV value) of the fractal dimensions calculated under each of the plurality of conditions is 0.1% or more and 2.0% or less,

wherein the fractal dimension is determined in accordance with the description according to the box counting method, and

the photographing was conducted by using a scanning electron microscope (SEM).

Claim 2. The porous membrane according to claim 1, wherein the porous membrane contains a thermoplastic resin.

Claim 3. The porous membrane according to claim 1 or 2, wherein a structure of the porous membrane is a three-dimensional network structure.

Claim 4. The porous membrane according to any one of claims 1 to 3, wherein the porous membrane is in a hollow fiber form.

Claim 5. The porous membrane according to any one of claims 1 to 4, wherein the porous membrane has a tensile strength at break of 8.0 N/mm^2 or more and 15.0 N/mm^2 or less.

Claim 6. The porous membrane according to any one of claims 1 to 5, wherein the porous membrane has a tensile strength at break of 3.2 N/mm^2 or more and 6.5 N/mm^2 or less.

Claim 7. A method for manufacturing the porous membrane according to claim 5, the method comprising:

a preparation step of preparing a membrane-forming stock solution containing a thermoplastic resin, a filler, a solvent, and a phase separation accelerator;

an extrusion step of extruding the membrane-forming stock solution at a temperature higher than a phase separation onset temperature at which phase separation of the membrane-forming stock solution starts due to a temperature change; and

a formation step of forming a porous membrane on a basis of a thermally induced phase separation method in which the extruded membrane-forming stock solution is brought into contact with a coagulating liquid having a temperature lower than the phase separation onset temperature of the membrane-forming stock solution,

wherein a difference in the Hansen solubility parameter (an HSP distance) between the thermoplastic resin and a mixture of the solvent and the phase separation accelerator in the membrane-forming stock solution is 3.75 or more and 6.50 or less, and

a temperature difference between the temperature of the membrane-forming stock solution in the extrusion step and the temperature of the coagulating liquid in the formation step is 55°C or more and 100°C or less.

Claim 8. A method for manufacturing the porous membrane according to claim 6, the method comprising:

a preparation step of preparing a membrane-forming stock solution containing a thermoplastic resin, a solvent, and a phase separation accelerator;

an extrusion step of extruding the membrane-forming stock solution; and

a formation step of forming a porous membrane on the basis of a nonsolvent induced phase separation method in which the extruded membrane-forming stock solution is brought into contact with a coagulating liquid containing at least a nonsolvent,

wherein a difference in the Hansen solubility parameter (an HSP distance) between the thermoplastic resin and a mixture of the solvent and the phase separation accelerator in the membrane-forming stock solution is 4.85 or more and 7.50 or less, and

an HSP distance between the membrane-forming stock solution and the coagulating liquid is 30 or more and 34.2 or less.