[0122] Regarding the polymerization degree, the specific polymer according to the invention is preferably a 20-mer or more, more preferably a 30-mer or more. Further, the specific polymer according to the invention is preferably a 1,500-mer or less, more preferably a 1,000-mer or less.

[0123] In the composition for forming a layer to be plated according to the invention, a mixed solvent of water and water-soluble flammable liquid is used as a solvent, as described below.

[0124] The specific polymer described above is preferably contained in the range of from 1% by mass to 20% by mass, and more preferably from 2% by mass to 10% by mass, with respect to a total amount of the composition.

[0125] Mixed Solvent Containing from 20% By Mass to 99% By Mass of Water-Soluble Flammable Liquid and Water

[0126] The composition for forming a layer to be plated according to the invention contains, as well as a specific polymer described above, a mixed solvent containing both a water-soluble flammable liquid and water, which is capable of dissolving the specific polymer. It is necessary that the mixed solvent containing the water-soluble flammable liquid and water used in the invention contains from 20% by mass to 99% by mass of the water-soluble flammable liquid in terms of a total solvent. Herein, a mixed solvent in which the remainder other than the water-soluble flammable liquid is water is preferred. The content of the water-soluble flammable liquid in the mixed solvent is preferably in the range of from 30% by mass to 80% by mass, and more preferably from 35% by mass to 60% by mass.

Water-Soluble Flammable Liquid

[0127] The water-soluble flammable liquid used in the mixed solvent of the water-soluble flammable liquid and water is not specifically limited, so long as the flammable liquid dissolves 1% by mass or more thereof in water at ordinary temperature (25° C.). Further, the flammable liquid described in the present specification refers to flammable liquids as recited in the Fire Services Act.

[0128] Examples of the water soluble flammable solvent include organic solvents such as ketone-based solvents, ester-based solvents, alcohol-based solvents, ether-based solvents, amine-based solvents, thiol-based solvents and halogen-based solvents.

[0129] Examples of the ketone-based solvents include 4-hydroxy-4-methyl-2-pentanone, γ-butyrolactone and hydroxyacetone.

[0130] Examples of the ester-based solvents include 2-(2-ethoxyethoxy)ethyl acetate, ethylene glycol monomethyl ether acetate, diethylene glycol monoethyl ether acetate, methyl cellosolve acetate, 2-hydroxyethyl acrylate, hydroxypropyl acrylate, methyl glycolate and ethyl glycolate.

[0131] Examples of the alcohol-based solvent include methanol, ethanol, 1-methoxy-2-propanol, isopropyl alcohol, normal propyl alcohol, 3-acetyl-1-propanol, 2-(allyloxy) ethanol, 1-pentanol, 3-methyl-1-butanol, n-hexanol, 1-heptanol, 2-ethyl-1,3-hexanediol, 2-aminoethanol, 2-amino-2-methyl-1-propanol, (±)-2-amino-1-propanol, 3-amino-1-propanol, 2-dimethylaminoethanol, 2,3-epoxy-1-propanol, ethylene glycol, 2-fluoroethanol, diacetone alcohol, 2-methylcyclohexanol, 4-hydroxy-4-methyl-2-pentanone, glycerin, 2,2',2"-nitrilotriethanol, 2-pyridine methanol, 2,2,3,3-tetrafluoro-1-propanol, 2-(2-aminoethoxy)ethanol, 2-[2-(benzyloxy)ethoxy]ethanol, 2,3-butanediol, 2-butoxyethanol, 2,2'-thiodiethanol, 1,3-butanediol, 1,4-butanediol, 2,3-butanediol, 2-methyl-2,4-pentanediol, 1,3-propanediol, diglycerin, 2,2'-methyliminodiethanol and 1,2-pentanediol. In addition, the alcohol-based solvent includes alcohol derivatives such as 3-amino-1-propanol, trifluoroethyl methacrylate, and pentadecafluoro octanol.

[0132] Examples of the ether-based solvent include bis(2-ethoxyethyl)ether, bis[2-(2-hydroxyethoxy)ethyl]ether, 1,2-bis(2-methoxyethoxy)ethane, bis[2-(2-methoxyethoxy) ethyl]ether, bis(2-methoxyethyl)ether, 2-(2-butoxyethoxy) ethanol, 2-[2-(2-chloroethoxy)ethoxy]ethanol, 2-ethoxyethanol, 2-(2-ethoxyethoxy)ethanol, 2-isobutoxy ethanol, 2-(2-isobutoxyethoxy)ethanol, 2-isopropoxyethanol, 2-[2-(2-methoxyethoxy)ethoxy]ethanol, 2-(2-methoxyethoxy)ethanol, 1-ethoxy-2-propanol, 1-methoxy-2-propanol, tripropylene glycol monomethyl ether, methoxy acetate and 2-methoxy ethanol.

[0133] Examples of the glycol-based solvents include diethylene glycol, triethylene glycol, ethylene glycol, hexaethylene glycol, propylene glycol, dipropylene glycol and tripropylene glycol.

[0134] Examples of the amine-based solvent include N-methyl-2-pyrolidone and N,N-dimethyl formamide.

[0135] Examples of the thiol-based solvent include mercaptoacetic acid and 2-mercaptoethanol.

[0136] Examples of the halogen-based solvent include 3-bromobenzylalcohol, 2-chloroethanol and 3-chloro-1,2-propanediol.

[0137] Examples of the solvent contained in the water-soluble flammable liquid other than the above-described solvent include methyl lactate, ethyl lactate, morpholine, N-ethyl morpholine, formic acid, and acetic acid.

[0138] The water-soluble flammable liquid contained in the mixed solvent may be used singly or by mixing two or more kinds so long as a total content of the water-soluble flammable liquid is in the aforementioned range.

[0139] Water-Alcohol Mixed Solvent

[0140] Examples of the optimal embodiment of the mixed solvent containing both water and a water-soluble flammable liquid includes a water-alcohol mixed solvent using an alcohol-based solvent as the water-soluble flammable liquid.

[0141] It is necessary that the water alcohol solvent contains 20% by mass to 99% by mass of alcohol in the total solvent. Herein, a mixed solvent is preferred in which the remainder other than alcohol is water. The content of alcohol in the mixed solvent is preferably in the range from 30% by mass to 80% by mass, and more preferably from 35% by mass to 60% by mass.

[0142] The alcohol-based solvent used in the mixed solvent includes the alcohols and alcohol derivatives described above, and preferable examples include alcohol-based solvents such as methanol, ethanol, propanol, ethylene glycol, glycerine, propylene glycol monomethyl ether, and 1-methoxy-2-propanol.

[0143] The alcohol-based solvent contained in the mixed solvent may be used singly or by mixing two or more kinds

[0144] Further, in a water-alcohol mixed solvent containing alcohol and water that is an optimal solvent in the invention, the alcohol may be used together with acids such as acetic acid; or a ketone-based solvent such as acetone, methyl ethyl ketone and cyclohexanone; an amide-based solvent such as formamide, dimethyl acetamide, and N-methylpyrrolidone; a nitrile-based solvent such as acetonitrile and propyronitrile; an ester-based solvent such as methyl acetate and ethyl acetate; or a carbonate-based solvent such as dimethyl car-