Claims

[Claim 1]

A polishing pad, which comprises a polishing layer, wherein the polishing layer comprises a cured product of a composition comprising a urethane-based prepolymer, a curing agent, and a foaming agent, the curing agent comprises a tertiary amine-based polyol containing an ether bond, and the polishing pad has a surface roughness reduction rate (RSk (%)) of less than 50% as represented by the following Equation 1 and a recovery elasticity resistance index (RERI) of 40 or less as represented by the following Equation 2:

[Equation 1]

$$\text{RSk}\ (\%) = \frac{\text{Sk}_1 - \text{Sk}_2}{\text{Sk}_1} \times 100$$

in Equation 1, Sk_1 is the core roughness depth of the polishing pad before polishing, Sk_2 is the core roughness depth of the polishing pad measured after it polishes a silicon oxide layer of a semiconductor substrate for 60 seconds under the conditions of a carrier pressurization of 4.0 psi, a carrier rotation speed of 87 rpm, and a platen rotation speed of 93 rpm while a calcined ceria slurry is sprayed at a rate of 250 ml/minute, and Sk_1 and Sk_2 are each a value calculated from data measured by an optical surface roughness meter for the polishing pad before polishing and the polishing pad after polishing in accordance with the ISO 25178-2 standard,

[Equation 2]

$$\text{Recovery elasticity resistance index (RERI)} = \frac{\text{RSk}\ (\%)}{100\ (\%)} \times \text{H}_{25}$$

in Equation 2, RSk (%) is as defined in Equation 1 above, H_{25} is the Shore D hardness of the polishing pad measured at 25°C, and the recovery elasticity resistance index (RERI) is a ratio between values excluding units, and

wherein the polishing pad has a surface hardness at 25°C of 40 Shore D to 60 Shore D.

[Claim 2]

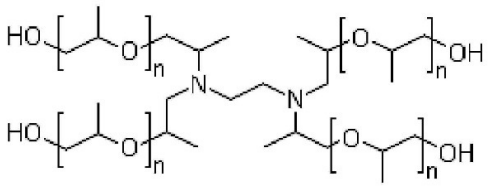
The polishing pad of claim 1, wherein the difference ($Sk_1 – Sk_2$) between Sk_1 and

Sk_2 is 15 μm or less.

[Claim 3]

The polishing pad of claim 1, wherein the tertiary amine-based polyol is represented by the following formula:

[Formula]



in the above formula, n is an integer of 1 to 10.

[Claim 4]

The polishing pad of claim 1, wherein the curing agent further comprises an aromatic amine compound.

[Claim 5]

The polishing pad of claim 4, wherein the content of the tertiary amine-based polyol is the same as, or greater than, the content of the aromatic amine compound by weight.

[Claim 6]

The polishing pad of claim 4, wherein the tertiary amine-based polyol has a weight average molecular weight of 400 to 3,000 g/mole, and the aromatic amine compound has a weight average molecular weight of 450 to 600 g/mole.

[Claim 7]

The polishing pad of claim 4, wherein the aromatic amine compound comprises at least one selected from the group consisting of diethyltoluenediamine; 3,5-dimethylthio-2,4-toluene diamine; 3,5-diethyltoluene-2,4-diamine; N,N'-bis-(sec-butylamino)-

diphenylmethane; 4,4′-methylene-bis-(3-chloro-2,6-diethylaniline); polytetramethyleneoxide-di-p-aminobenzoate; N,N'-dialkyldiamino diphenyl methane; p,p'-methylene dianiline; m-phenylenediamine; 4,4'-methylene-bis-(2,6-diethylaniline); 4,4′-methylene-bis-(2,3-dichloroaniline); 4,4'-diamino-3,3'-diethyl-5,5'-dimethyl diphenylmethane; 2,2',3,3'-tetrachlorodiamino diphenylmethane; trimethylene glycol di-p-aminobenzoate; 3,5-diamino-4-chloro benzoic acid-2-methylpropyl ester; bis(4-amino-2-chloro-3,5-diethylphenyl)methane; propanediol bis-p-aminobenzoate; butyl diaminochlorobenzoate; methylene bis-methylanthranilate; chloro diethyltoluenediamine; methylene bis-o-ethylaniline; and isomers thereof.

[Claim 8]

The polishing pad of claim 1, which satisfies at least one selected from the following characteristics: a tensile strength of 10 N/mm^2 to 25 N/mm^2; an elongation of 80% to 320%; and a polishing rate for an oxide layer of 1,600 Å/minute to 3,300 Å/minute.

[Claim 9]

A process for preparing a polishing pad, which comprises:

mixing a urethane-based prepolymer, a curing agent, and a foaming agent to prepare a composition for preparing a polishing layer; and

injecting the composition for preparing a polishing layer into a mold and curing it to obtain a polishing pad comprising a polishing layer,

wherein the curing agent comprises a tertiary amine-based polyol containing an ether bond, and the polishing pad has a surface roughness reduction rate (RSk (%)) of less than 50% as represented by the following Equation 1 and a recovery elasticity resistance index (RERI) of 40 or less as represented by the following Equation 2:

[Equation 1]

$$\text{RSk (\%)} = \frac{Sk_1 - Sk_2}{Sk_1} \times 100$$

in Equation 1, Sk_1 is the core roughness depth of the polishing pad before polishing,

Sk_2 is the core roughness depth of the polishing pad measured after it polishes a silicon oxide layer of a semiconductor substrate for 60 seconds under the conditions of a carrier pressurization of 4.0 psi, a carrier rotation speed of 87 rpm, and a platen rotation speed of 93 rpm while a calcined ceria slurry is sprayed at a rate of 250 ml/minute, and Sk_1 and Sk_2 are each a value calculated from data measured by an optical surface roughness meter for the polishing pad before polishing and the polishing pad after polishing in accordance with the ISO 25178-2 standard,

[Equation 2]

Recovery elasticity resistance index (RERI) = $\frac{\text{RSk (\%)}}{100\ (\%)} \times H_{25}$

in Equation 2, RSk (%) is as defined in Equation 1 above, H_{25} is the Shore D hardness of the polishing pad measured at 25°C, and the recovery elasticity resistance index (RERI) is a ratio between values excluding units, and

wherein the polishing pad has a surface hardness at 25°C of 40 Shore D to 60 Shore D.

[Claim 10]

A process for preparing a semiconductor device, which comprises:

providing a polishing pad comprising a polishing layer; and

relatively rotating the polishing surface of the polishing layer and the surface of an object to be polished while they are in contact with each other to polish the object to be polished,

wherein the polishing pad comprises a polishing layer comprising a cured product of a composition comprising a urethane-based prepolymer, a curing agent, and a foaming agent, the curing agent comprises a tertiary amine-based polyol containing an ether bond, and the polishing pad has a surface roughness reduction rate (RSk (%)) of less than 50% as represented by the following Equation 1 and a recovery elasticity resistance index (RERI) of 40 or less as represented by the following Equation 2:

[Equation 1]

$$\text{RSk}\ (\%) = \frac{Sk_1 - Sk_2}{Sk_1} \times 100$$

in Equation 1, Sk_1 is the core roughness depth of the polishing pad before polishing, Sk_2 is the core roughness depth of the polishing pad measured after it polishes a silicon oxide layer of a semiconductor substrate for 60 seconds under the conditions of a carrier pressurization of 4.0 psi, a carrier rotation speed of 87 rpm, and a platen rotation speed of 93 rpm while a calcined ceria slurry is sprayed at a rate of 250 ml/minute, and Sk_1 and Sk_2 are each a value calculated from data measured by an optical surface roughness meter for the polishing pad before polishing and the polishing pad after polishing in accordance with the ISO 25178-2 standard,

[Equation 2]

$$\text{Recovery elasticity resistance index (RERI)} = \frac{\text{RSk}(\%)}{100(\%)} \times H_{25}$$

in Equation 2, RSk (%) is as defined in Equation 1 above, H_{25} is the Shore D hardness of the polishing pad measured at 25℃, and the recovery elasticity resistance index (RERI) is a ratio between values excluding units, and

wherein the polishing pad has a surface hardness at 25℃ of 40 Shore D to 60 Shore D.