semiconductor onto an interlayer dielectric layer formed at the side surfaces of the recessed groove.

[0008] A third aspect of the present invention is a semiconductor device having a structure comprising a porous interlayer dielectric layer, a resin layer and a layer comprising copper, in this order, the resin layer having a thickness of from 0.3 nm to 5 nm and comprising a resin having two or more cationic functional groups and a weight-average molecular weight of from 2,000 to 100,000. In an embodiment, there is a semiconductor device including a porous interlayer dielectric layer, a resin layer and a layer composed of copper in this order, the resin layer having a thickness of from 0.3 nm to 5 nm and including a resin having a cationic functional group and a weight-average molecular weight of from 2,000 to 100,000. More preferably, a copper barrier layer is provided between the resin layer and the layer of copper.

Effect of the Invention

[0009] According to the present invention, it is possible to provide a composition for sealing a semiconductor, the composition being able to form a thin resin layer, suppress the diffusion of a metal component to a porous interlayer dielectric layer, and exhibit superior adherence with respect to an interconnection material; a semiconductor device using the composition; and a method of producing the semiconductor device.

Best Mode for Carrying Out the Invention

[0010] (Composition for sealing semiconductor)

The composition for sealing a semiconductor according to the present invention is used, for example, to form a resin layer that covers pores formed in a porous interlayer dielectric layer. The composition includes at least one type of resin having two or more cationic functional groups and a weight-average molecular weight of from 2,000 to 100,000, and includes sodium and potassium each in an amount based on element content of not more than 10 ppb. The volume average particle diameter of the composition measured by a dynamic light scattering method is not more than 10 nm.

When a composition for sealing a semiconductor having the above constitution is applied to an interlayer dielectric layer having a porous structure, pores existing on the surface of the interlayer dielectric layer are covered with a resin layer by way of, for example, multiple-point adsorption of the two or more cationic functional groups to the interlayer dielectric layer. As a result, diffusion of a metal component to the porous interlayer dielectric layer can be suppressed. Furthermore, since the resin layer formed from the resin has a small thickness (*e.g.*, 5 nm or less), the adherence between the interlayer dielectric layer and an interconnection material formed on the interlayer dielectric layer via the resin layer is excellent, whereby changes in the relative dielectric constant can be suppressed.

[0011] (Resin)

The composition for sealing a semiconductor according to the present invention includes at least one type of resin having two or more cationic functional groups and a weight-average molecular weight of from 2,000 to 100,000.