Patent Literature 10: Japanese Patent Application Publication No. 2010-240777

Summary ~~of Invention~~

Object to be solved

However, the above-described dry polishing pads are still hard, and tend to apply a pressure to a workpiece in a localized manner. Hence, the dry polishing pads are unsatisfactory in terms of reduction of polishing scars (scratches) formed on the surface of a workpiece. In addition, the dry polishing pads still have a problem of high possibility of clogging. For this reason, in general, after polishing with a hard polishing pad molded by the dry method, it is necessary to further perform finish polishing by using a polishing pad having a soft polishing layer molded by a wet method (in the wet method, a resin solution obtained by dissolving a resin in a water-miscible organic solvent is applied onto a sheet-shaped film formation substrate, and then the resin is coagulated and regenerated in an aqueous coagulating liquid).

On the other hand, a polishing pad having a soft polishing layer molded by a wet method has a low hardness, has large openings of a suede type, and has a non-uniform foam structure. For these reasons, although polishing using the polishing pad having a soft polishing layer achieves better polishing rate and polishing uniformity (uniformity: followability of the pad surface to waves and warp of a workpiece) than polishing using a polishing pad having a hard polishing layer molded by a dry method, the polishing pad having a soft polishing layer has the following problem. Specifically, because of its anisotropic cell shape, the state of the openings on the surface changes due to wearing, or a low-density portion of the

polishing layer at a lower portion thereof is torn off. Hence, the polishing pad having a soft polishing layer cannot retain a polishing state at a certain level for a long period.

Hence, there is a need for a polishing pad which can be used also for finish polishing, while taking advantages of a polishing pad having a polishing layer molded by a dry method.

The present disclosure~~invention~~ has been made in view of the above-described problems, and an object of the present disclosure~~invention~~ is to provide a polishing pad which remedies the problem of scratches occurring when a conventional hard (dry) polishing pad is used, which is excellent in polishing rate and polishing uniformity, and which can be used for not only primary polishing but also finish polishing, and a manufacturing method therefor.

Means for solving the object

To achieve the above object, the present disclosure provides, in one aspect, a polishing pad for polishing a semiconductor device, comprising a polishing layer having a polyurethane-polyurea resin foam containing substantially spherical cells, wherein when a free induction decay signal (FID) of the polyurethane-polyurea resin foam obtained by pulsed NMR is subjected to waveform separation by sequentially subtracting components in descending order of spin-spin relaxation time T2 based on a least-squares method, and thus divided into three components of L (amorphous phase), M (interface phase), and S (crystalline phase) in descending order of spin-spin relaxation time T2, the M-component has a spin-spin relaxation time $T2_M$ of 160 to 260 μs, the

polyurethane-polyurea resin foam has a storage elastic modulus E′ of 1 to 30 MPa, the storage elastic modulus E′ being measured at 40°C with an initial load of 10 g, a strain range of 0.01 to 4%, and a measuring frequency of 0.2 Hz in a tensile mode, and the polyurethane-polyurea resin foam has a density D in a range from 0.30 to 0.60 g/cm^3.

In another aspect of the present disclosure, there is provided a method for manufacturing the polishing pad as defined herein, the method comprising: a preparation step of preparing an isocyanate group-containing compound (A), a polyisocyanate compound (B), a polyamine compound (D), a mixture liquid (E) comprising water, a foam stabilizer, and a reaction catalyst, and a gas non-reactive with all the components; a mixing step of mixing at least the isocyanate group-containing compound (A), the polyisocyanate compound (B), the polyamine compound (D), the mixture liquid (E) comprising the water, the foam stabilizer, and the reaction catalyst, and the gas non-reactive with all the components with each other to obtain a mixture liquid for molding a foam; a foam-molding step of molding a polyurethane-polyurea resin foam from the mixture liquid for molding a foam; and a polishing layer formation step of forming a polishing layer having a polishing surface for polishing a workpiece from the polyurethane-polyurea resin foam.

~~t~~The present disclosure~~invention~~ further employs the following configurations.

1. A polishing pad for polishing a semiconductor device, comprising a polishing layer having a polyurethane-polyurea resin foam containing substantially spherical cells, wherein

when a free induction decay signal (FID) of the polyurethane-polyurea resin foam obtained by pulsed NMR is subjected to waveform separation by sequentially subtracting components in descending order of spin-spin relaxation time T2 based on a least-squares method, and thus divided into three components of L (amorphous phase), M (interface phase), and S (crystalline phase) in descending order of spin-spin relaxation time T2, the M-component has a spin-spin relaxation time T2 (hereinafter, referred to as $T2_M$ in some cases) of 160 to 260 μs,