comprises nickel-phosphorous on a surface of the substrate, and wherein at least a portion of the nickel-phosphorous on a surface of the substrate is abraded to polish the substrate.

EXAMPLES

[0072] The following examples further illustrate the invention but, of course, should not be construed as in any way limiting its scope.

[0073] In the examples that follow, nickel-phosphorus-coated aluminum disks were polished with a Ceiba CR200™ polishing pad using a Speedfam™ 16B polisher (Konegawa, Japan). Twenty (20) disks were polished in each run at a slurry flow rate of 550 mL/min to a target NiP removal amount of 150 ± 5 mg. After polishing, the disks were cleaned in an ultrasonic bath using a cleaning solution, and then dried. Edge roll-off measurements XRC (extreme radius of curvature) and XRCE (extreme radius of curvature at the extreme edge of the disk) were determined using a Zygo Newview™ 100 (Middlefield, CT) at 80-600 μm wavelength. Two disks from each run were measured at 120°, 240°, and 360° of the disk (double-sided), respectively. Lower XRC/XRCE values indicate lesser edge roll-off.

[0074] All of the polishing compositions comprised a base formulation comprising 0.8 wt.% fused silica having an average particle size of 0.45 μm (i.e., 450 nm), 3.4 wt.% of colloidal silica having an average particle size of 110 nm, 0.8 wt.% of colloidal silica having an average particle size of 70 nm, 0.2 wt.% of glycine, 1.2 wt.% of hydrogen peroxide, and 1.6 wt.% of phosphoric acid, with the balance (92%) as deionized water. The pH of the polishing compositions at the point-of-use was 1.5 ± 0.1.

EXAMPLE 1

[0075] This example demonstrates the effect of addition of a compound of formula (I) on the XRC and XRCE exhibited by the base formulation, in accordance with an embodiment of the invention.

[0076] Nickel-phosphorus-coated aluminum disks were polished with Polishing Compositions 1A-1O. Polishing Composition 1A (control) was the base formulation and did not contain a compound of formula (I). Polishing Compositions 1B-1O (inventive) included the base formulation and further contained a compound of formula (I) of the type and in the amount shown in Table 1.

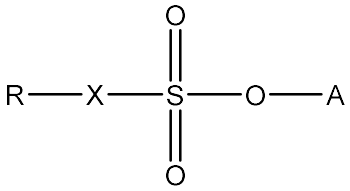
[0077] Following polishing, the XRC and XRCE were determined, and the results are set forth in Table 1.

CLAIM(S):

1. A chemical-mechanical polishing composition comprising:

(a) an abrasive comprising colloidal silica and fused silica,

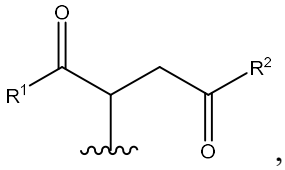
(b) about 10 ppm to about 1000 ppm of a compound of formula (I):



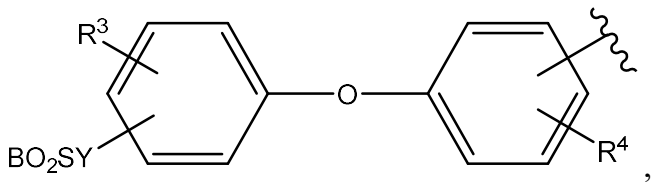
(I)

wherein R is selected from

a straight chain or branched chain C_1-C_{20} alkyl.



,



,

$R^5C_6H_4$, and

R^6-O-$(R^7O)_n$-,

wherein R^1-R^5 are independently selected from straight chain or branched chain C_1-C_{20} alkyls,

wherein R^6 is a straight chain or branched chain C_1-C_{20} alkyl or R^8-C_6H_4-,

wherein R^7 is a straight chain or branched chain C_2-C_{10} alkylene,

wherein R^8 is a straight chain or branched chain C_1-C_{20} alkyl,

wherein n is an integer of from 1 to about 20,

wherein X and Y are independently O or a covalent bond, and

wherein A and B are independently an alkali metal cation or an organic amine compound,

(c) an amino acid,

(d) hydrogen peroxide, and

(e) water,

wherein the polishing composition has a pH of about 1 to about 5.

2. The polishing composition of claim 1, wherein the colloidal silica has an average particle size of about 10 nm to about 200 nm.

3. The polishing composition of claim 1, wherein the fused silica has an average particle size of about 100 nm to about 800 nm.

4. The polishing composition of claim 1, wherein the compound of formula (I) is selected from sodium dodecyl sulfate, diethylhexyl sulfosuccinate, dodecylbenzene sulfonate, a sec-alkyl derivative of benzenesulfonic acid, an alkyl diphenyloxide disulfonate, secondary alkane sulfonate, mono alkyl branched propoxy sulfate, polyethyleneglycol nonylphenyl ether sulfate and combinations thereof.

5. The polishing composition of claim 1, wherein the amino acid is glycine or alanine.

6. The polishing composition of claim 1, wherein the polishing composition comprises about 100 ppm to about 500 ppm of the compound of formula (I).

7. The polishing composition of claim 1, wherein the polishing composition comprises about 0.1 wt.% to about 10 wt.% of a combination of colloidal silica and fused silica.

8. A method of chemically mechanically polishing a substrate comprising:

(i) providing a substrate,

(ii) providing a polishing pad,

(iii) providing the chemical-mechanical polishing composition of claim 1,

(iv) contacting the substrate with the polishing pad and the chemical-mechanical polishing composition, and

(v) moving the polishing pad and the chemical mechanical polishing composition relative to the substrate to abrade at least a portion of a surface of the substrate to thereby polish the substrate.

9. The method of claim 8, wherein the substrate is a nickel-phosphorous-coated aluminum memory disk, wherein the substrate comprises nickel-phosphorous on a surface of the substrate, and wherein at least a portion of the nickel-phosphorous on a surface of the substrate is abraded to polish the substrate.