

~~THAT WHICH IS CLAIMED~~ CLAIMS:

1. A CMP polishing pad comprising:

a polishing layer having a polishing surface and a back surface opposite said polishing surface; said polishing layer having at least one cured closed cell, thermoset polyurethane or polyurea opaque region and at least one aperture region; said at least one cured closed cell, thermoset polyurethane or polyurea opaque region having a porosity from about 10% to about 55% by volume; said at least one aperture region having (1) a top opening positioned below the polishing surface, (2) a bottom opening that is co-planar with said back surface and (3) straight line vertical sidewalls extending from said aperture top opening to said aperture bottom opening; said at least one aperture region filled with a cured plug of thermoset polyurethane or polyurea local area transparency (LAT) material that has a light transmission of less than 80% at a wavelength of 700 to 710 nanometers and is ~~chemically~~ covalently bonded ~~directly~~ to a thermoset polyurethane opaque area.

2. The polishing pad of claim 1, further comprising:

an aperture-free removable release sheet covering at least a portion of said back surface of the polishing layer; and

an adhesive layer interposed between said polishing layer and said release sheet; said adhesive layer capable of adhering the polishing layer to a platen of a CMP apparatus after said release sheet has been removed.

3. The polishing pad of claim 1, wherein said at least one opaque region is compression molded around said at least one plug of thermoset polyurethane or polyurea LAT material that is previously partially cured.

4. The polishing pad of claim 1, wherein the polishing layer is from about 50 mils to about 200 mils (about 1.27 to 5.08 mm) and the thickness of the LAT material is from about 35 to about 150 mils (about 0.9 to 3.8 mm).

5. The polishing pad of claim 1, wherein a plateau plane surrounding the top opening of the at least one aperture region has a width from about 5 mils to about 50 mils (about 0.13 to 1.27 mm).

6. The polishing pad of claim 2, wherein the aperture-free removable release sheet is a polyethylene terephthalate film.
7. The polishing pad of claim 2, wherein said adhesive layer is an acrylic-type pressure sensitive adhesive.
8. The polishing pad of claim 1, wherein a groove pattern is positioned in the at least one opaque region of the polishing surface and the top surface of said at least one aperture region is flat and contains no groove pattern.
9. The polishing pad of claim 1, wherein the groove pattern has a depth(s) of about 15 mils to about 100 mils (about 0.4 to 2.5 mm), a width(s) of about 15 mils to about 50 mils (about 0.4 to 1.3 mm) and pitch(s) from about 30 mils to about 1000 mils (about 0.8 to 2.5 mm).
10. The polishing pad of claim 1, wherein the hardness of the opaque region of the pad is from about 25 to about 75 Shore D, the hardness of the LAT material is from about 25 to about 75 Shore D, the density of the opaque region of the pad is from about 0.6 to 1.2 grams per cubic centimeter, and the density of the LAT material is from about 1 to about 1.2 grams per cubic centimeter.
11. An assembly that is a non-liquid, partially cured thermoset local area transparency (LAT) intermediate material having a surface affixed to at least one support member.
12. The assembly of claim 11, wherein the at least one support member comprises a polymeric film having one surface attached to the partially cured thermoset LAT intermediate material surface and having an opposite surface attached to at least one holding member by an adhesive layer.
13. The assembly of claim 12, wherein the polymeric film is a polyimide film.

14. The assembly of claim 12 wherein the at least one holding member is at least one epoxy resin block.

15. A method of making a CMP polishing pad that comprises the steps of:

(1) providing a first assembly of a non-liquid, partially cured thermoset polyurethane or polyurea local area transparency (LAT) intermediate material having one surface affixed to at least one support member;

(2) positioning said first assembly in a polishing pad making apparatus whereby the affixed surface of the partially cured thermoset polyurethane or polyurea LAT intermediate material is located between the polishing surface and bottom surface of the polishing pad that will be formed in the apparatus;

(3) introducing opaque thermoset polyurethane or polyurea intermediate material into said polishing pad making apparatus;

(4) co-curing the partially cured thermoset polyurethane or polyurea LAT intermediate material and the opaque thermoset polyurethane or polyurea intermediate material by compression molding to form a polishing layer having a polishing surface and a back surface opposite said polishing surface; said polishing layer having at least one cured closed cell, opaque thermoset polyurethane or polyurea region and at least one aperture region; said at least one cured closed cell, opaque thermoset polyurethane or polyurea region having a porosity from about 10% to about 55% by volume; said at least one aperture region having (a) a top opening positioned below the polishing surface that is surrounded by a plateau plane, (b) a bottom opening that is co-planar with said back surface and (c) straight line vertical sidewalls extending from said aperture top opening to said aperture bottom opening; said at least one aperture region containing a plug of cured thermoset polyurethane or polyurea LAT material, formed from the partially cured thermoset polyurethane or polyurea LAT intermediate material, that is chemically bonded directly to an opaque thermoset polyurethane or polyurea area.

16. The method of claim 15 further comprising (5) removing a back portion of the polishing layer to form a polishing pad of predetermined desired thickness, said removing step creating a new bottom surface of the cured thermoset polyurethane or polyurea LAT material so that the cured thermoset polyurethane or polyurea LAT material is co-planar with the back surface of the opaque portion of the polishing pad.

17. The method of claim 16 further comprising (6) attaching an aperture-free removable release sheet covering at least a portion of said back surface of the polishing layer with an adhesive layer interposed between said polishing layer and said release sheet, said adhesive layer capable of adhering the polishing layer to a platen of a CMP apparatus after said release sheet has been removed.

18. A method of producing a workpiece, which comprises a step of polishing a surface of a workpiece with a polishing pad of claim 1.

19. The method of claim 18, wherein the method further comprises monitoring the progress of polishing of the workpiece, while the polishing pad is moved relative to the workpiece to abrade the workpiece and thereby polishing the workpiece, with an in situ polishing endpoint detection system.

20. The method of claim 19, wherein the method further comprises determining the endpoint of the polishing of the workpiece with the in situ polishing endpoint detection system.