CLAIMS ~~What is claimed is~~:

1. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface; and

an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein:

at least a portion of ~~which~~the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body and

at least a portion of the end-point detection region is recessed relative to the polishing surface of the molded homogeneous polishing body..

~~2. The polishing pad of claim 1, wherein at least a portion of the end-point detection region is recessed relative to the polishing surface of the molded homogeneous polishing body.~~

2~~3~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface; and

an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein:

at least a portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body; and~~The polishing pad of claim 1, wherein~~

the end-point detection region is a local area transparency (LAT) region.

3~~4~~. The polishing pad of claim ~~3~~2, wherein the hardness of the end-point detection region is greater than the hardness of the molded homogeneous polishing body.

4~~5~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface; and

an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein:

at least a portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body; and~~The polishing pad of claim 1, wherein~~

the end-point detection region is an opaque region having a hardness different from the hardness of the molded homogeneous polishing body.

5~~6~~. The polishing pad of claim ~~5~~4, wherein the hardness of the end-point detection region is greater than the hardness of the molded homogeneous polishing body.

6~~7~~. The polishing pad of claim ~~5~~4, wherein the hardness of the end-point detection region is less than the hardness of the molded homogeneous polishing body.

7~~8~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface; and

an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body;~~The polishing pad of claim 1,~~ wherein the entire end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body.

8~~9~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface; and

an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein:

~~The polishing pad of claim 1, wherein~~ only an inner portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body.

9~~10~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface; and

an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein:

at least a portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body; and~~The polishing pad of claim 1, wherein~~

the molded homogeneous polishing body comprises a thermoset, closed cell polyurethane material.

10~~11~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface; and

an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein:

at least a portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body; and~~The polishing pad of claim 1, wherein~~

the polishing surface comprises a pattern of grooves disposed in the polishing surface.

11~~12~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a molded homogeneous polishing body comprising a polishing surface and a back surface; and

forming an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein: at least a portion of ~~which~~the end-point detection region is recessed relative to the back

surface of the molded homogeneous polishing body; and the end-point detection region is a local area transparency (LAT) region.

~~13. The method of claim 12, wherein the end-point detection region is a local area transparency (LAT) region.~~

12~~14~~. The method of claim ~~13~~11, wherein the hardness of the end-point detection region is greater than the hardness of the molded homogeneous polishing body.

13~~15~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a molded homogeneous polishing body comprising a polishing surface and a back surface; and

forming an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein: at least a portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body; and~~The method of claim 12, wherein~~ the end-point detection region is an opaque region having a hardness different from the hardness of the molded homogeneous polishing body.

14~~16~~. The method of claim ~~15~~13, wherein the hardness of the end-point detection region is greater than the hardness of the molded homogeneous polishing body.

15~~17~~. The method of claim ~~15~~13, wherein the hardness of the end-point detection region is less than the hardness of the molded homogeneous polishing body.

16~~18~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a molded homogeneous polishing body comprising a polishing surface and a back surface; and

forming an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a

material different from the molded homogeneous polishing body ~~The method of claim 12~~, wherein the entire end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body.

17~~19~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a molded homogeneous polishing body comprising a polishing surface and a back surface; and

forming an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body ~~The method of claim 12~~, wherein only an inner portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body.

18~~20~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a molded homogeneous polishing body comprising a polishing surface and a back surface; and

forming an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein: at least a portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body; and~~The method of claim 12, wherein~~ the molded homogeneous polishing body comprises a thermoset, closed cell polyurethane material.

19~~21~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a molded homogeneous polishing body comprising a polishing surface and a back surface; and

forming an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body, the end-point detection region comprising a material different from the molded homogeneous polishing body, wherein: at least

a portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body; and~~The method of claim 12, wherein~~ the polishing surface comprises a pattern of grooves disposed in the polishing surface.

20~~22~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface;

a pattern of grooves disposed in the polishing surface, the pattern of grooves having a bottom depth; and

an end-point detection region formed in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, wherein ~~at least a portion of~~ the entire first surface is substantially co-planar with the bottom depth of the pattern of grooves and interrupting the pattern of grooves, and the second surface is recessed into the molded homogeneous polishing body relative to the back surface.

~~23. The polishing pad of claim 22, wherein the entire first surface of the end-point detection region is essentially co-planar with the bottom depth of the pattern of grooves.~~

21~~24~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface;

a pattern of grooves disposed in the polishing surface, the pattern of grooves having a bottom depth; and

an end-point detection region formed in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, wherein at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and interrupting the pattern of grooves, the second surface is recessed into the molded

homogeneous polishing body relative to the back surface; and~~The polishing pad of claim 22, wherein~~ the first surface of the end-point detection region comprises a second pattern of grooves having a depth ~~essentially~~substantially co-planar with the bottom depth of the pattern of grooves disposed in the polishing surface.

22~~25~~. The polishing pad of claim ~~24~~21, wherein individual grooves of both the pattern of grooves and the second pattern of grooves are spaced apart by a width, and wherein the second pattern of grooves is offset from the pattern of grooves by a distance greater than the width.

23~~26~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface;

a pattern of grooves disposed in the polishing surface, the pattern of grooves having a bottom depth; and

an end-point detection region formed in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, wherein at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and interrupting the pattern of grooves, the second surface is recessed into the molded homogeneous polishing body relative to the back surface; and ~~The polishing pad of claim 22, wherein~~ the molded homogeneous polishing body comprises a thermoset, closed cell polyurethane material.

24~~27~~. A polishing pad for polishing a semiconductor substrate, the polishing pad comprising:

a molded homogeneous polishing body comprising a polishing surface and a back surface;

a pattern of grooves disposed in the polishing surface, the pattern of grooves having a bottom depth; and

an end-point detection region formed in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a

second surface oriented with the back surface, wherein at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and interrupting the pattern of grooves, the second surface recessed into the molded homogeneous polishing body relative to the back surface; and ~~The polishing pad of claim 22, wherein~~ the molded homogeneous polishing body, including the end-point detection region, is opaque.

25~~28~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a polishing pad precursor mixture in a formation mold;

positioning a lid of the formation mold into the polishing pad precursor mixture, the lid having a pattern of grooves disposed thereon, the pattern of grooves having an interrupted region;

curing the polishing pad precursor mixture to provide a molded homogeneous polishing body comprising a polishing surface and a back surface, wherein the pattern of grooves from the lid is disposed in the polishing surface, with the pattern of grooves having a bottom depth; and

forming~~providing~~ an end-point detection region in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and including the interrupted region of the pattern of grooves, ~~and~~ the second surface is recessed into the molded homogeneous polishing body relative to the back surface, and the end-point detection region is formed by routing out a portion of the molded homogeneous polishing body.

~~29. The method of claim 28, wherein providing the end-point detection region is performed by routing out a portion of the molded homogeneous polishing body.~~

26~~30~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a polishing pad precursor mixture in a formation mold;

positioning a lid of the formation mold into the polishing pad precursor mixture, the lid having a pattern of grooves disposed thereon, the pattern of grooves having an interrupted region;

curing the polishing pad precursor mixture to provide a molded homogeneous polishing body comprising a polishing surface and a back surface, wherein the pattern of grooves from the lid is disposed in the polishing surface, with the pattern of grooves having a bottom depth; and

forming an end-point detection region in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and including the interrupted region of the pattern of grooves, the second surface is recessed into the molded homogeneous polishing body relative to the back surface, and ~~The method of claim 28, wherein providing~~ the end-point detection region is ~~per~~formed by removing a sacrificial layer embedded in the molded homogeneous polishing body.

27~~31~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a polishing pad precursor mixture in a formation mold;

positioning a lid of the formation mold into the polishing pad precursor mixture, the lid having a pattern of grooves disposed thereon, the pattern of grooves having an interrupted region;

curing the polishing pad precursor mixture to provide a molded homogeneous polishing body comprising a polishing surface and a back surface, wherein the pattern of grooves from the lid is disposed in the polishing surface, with the pattern of grooves having a bottom depth; and

forming an end-point detection region in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, the entire first surface is substantially co-planar with the bottom depth of the pattern of grooves and including the interrupted region of the pattern of grooves, and the second surface is recessed into the molded homogeneous polishing body relative to the back surface~~The method of claim 28, wherein the entire first~~

~~surface of the end-point detection region is essentially co-planar with the bottom depth of the pattern of grooves~~.

28~~32~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a polishing pad precursor mixture in a formation mold;

positioning a lid of the formation mold into the polishing pad precursor mixture, the lid having a pattern of grooves disposed thereon, the pattern of grooves having an interrupted region;

curing the polishing pad precursor mixture to provide a molded homogeneous polishing body comprising a polishing surface and a back surface, wherein the pattern of grooves from the lid is disposed in the polishing surface, with the pattern of grooves having a bottom depth; and

forming an end-point detection region in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and including the interrupted region of the pattern of grooves, the second surface is recessed into the molded homogeneous polishing body relative to the back surface, and~~The method of claim 28, wherein~~ the first surface of the end-point detection region comprises a second pattern of grooves having a depth ~~essentially~~substantially co-planar with the bottom depth of the pattern of grooves disposed in the polishing surface of the molded homogeneous polishing body.

29~~33~~. The method of claim ~~32~~28, wherein individual grooves of both the pattern of grooves and the second pattern of grooves are spaced apart by a width, and wherein the second pattern of grooves is offset from the first pattern of grooves by a distance greater than the width.

30~~34~~. The method of claim ~~32~~28, wherein the molded homogeneous polishing body comprises a thermoset, closed cell polyurethane material.

31~~35~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming a polishing pad precursor mixture in a formation mold;

positioning a lid of the formation mold into the polishing pad precursor mixture, the lid having a pattern of grooves disposed thereon, with the pattern of grooves having an interrupted region;

curing the polishing pad precursor mixture to provide a molded homogeneous polishing body comprising a polishing surface and a back surface, wherein the pattern of grooves from the lid is disposed in the polishing surface, with the pattern of grooves having a bottom depth; and

forming an end-point detection region in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, wherein: at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and including the interrupted region of the pattern of grooves, the second surface is recessed into the molded homogeneous polishing body relative to the back surface, and ~~The method of claim 28, wherein the molded homogeneous polishing body, including~~ the end-point detection region, is opaque.

32~~36~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming, by a molding process, a polishing pad comprising:

a homogeneous polishing body having a polishing surface and a back surface;

a pattern of grooves disposed in the polishing surface, with the pattern of grooves having a bottom depth; and

an end-point detection region formed in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, wherein ~~at least a portion of~~ the entire first surface is substantially co-planar with the bottom depth of the pattern of grooves and interrupting the pattern of grooves, and the second surface is recessed into the molded homogeneous polishing body relative to the back surface.

~~37. The method of claim 36, wherein the entire first surface of the end-point detection region is essentially co-planar with the bottom depth of the pattern of grooves.~~

3338. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming, by a molding process, a polishing pad comprising:

a homogeneous polishing body having a polishing surface and a back surface;

a pattern of grooves disposed in the polishing surface, with the pattern of grooves having a bottom depth; and

an end-point detection region formed in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, wherein at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and interrupting the pattern of grooves, the second surface is recessed into the molded homogeneous polishing body relative to the back surface, and ~~The method of claim 36, wherein~~ the first surface of the end-point detection region comprises a second pattern of grooves having a depth ~~essentially~~substantially co-planar with the bottom depth of the pattern of grooves disposed in the polishing surface.

3439. The method of claim ~~38~~33, wherein individual grooves of both the pattern of grooves and the second pattern of grooves are spaced apart by a width, and wherein the second pattern of grooves is offset from the pattern of grooves by a distance greater than the width.

3540. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming, by a molding process, a polishing pad comprising:

a homogeneous polishing body having a polishing surface and a back surface;

a pattern of grooves disposed in the polishing surface, the pattern of grooves having a bottom depth; and

an end-point detection region formed in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, wherein at least a portion of the first

surface is substantially co-planar with the bottom depth of the pattern of grooves and interrupting the pattern of grooves, the second surface is recessed into the molded homogeneous polishing body relative to the back surface, and ~~The method of claim 36, wherein~~ the molded homogeneous polishing body comprises a thermoset, closed cell polyurethane material.

36~~41~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming, by a molding process, a polishing pad comprising:

a homogeneous polishing body having a polishing surface and a back surface;

a pattern of grooves disposed in the polishing surface, with the pattern of grooves having a bottom depth; and

an end-point detection region formed in the molded homogeneous polishing body, the end-point detection region having a first surface oriented with the polishing surface and a second surface oriented with the back surface, wherein at least a portion of the first surface is substantially co-planar with the bottom depth of the pattern of grooves and interrupting the pattern of grooves, the second surface is recessed into the molded homogeneous polishing body relative to the back surface, and ~~The method of claim 36, wherein~~ the molded homogeneous polishing body, including the end-point detection region, is opaque.

37~~42~~. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

forming, in a first formation mold, a partially cured end-point detection region precursor;

positioning the partially cured end-point detection region precursor on a receiving region of a lid of a second formation mold;

providing a polishing pad precursor mixture in the second formation mold;

moving, by bringing together the lid and a base of the second formation mold, the partially cured end-point detection region precursor into the polishing pad precursor mixture;

heating the polishing pad precursor mixture and the partially cured end-point detection region precursor to provide a molded homogeneous polishing body covalently

bonded with a cured end-point detection region precursor, the molded homogeneous polishing body having a polishing surface and a back surface; and

recessing, relative to the back surface of the molded homogeneous polishing body, the cured end-point detection region precursor to provide an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body.

3843. The method of claim 4237, wherein the recessing is performed by routing out a portion of the cured end-point detection region precursor.

3944. The method of claim 4237, wherein the partially cured end-point detection region precursor includes a sacrificial layer, and wherein the recessing is performed by removing the sacrificial layer.

4045. The method of claim 4237, wherein the end-point detection region comprises a material different from the molded homogeneous polishing body.

4146. The method of claim 4540, wherein the end-point detection region is a local area transparency (LAT) region.

4247. The method of claim 4540, wherein the end-point detection region is an opaque region having a hardness different from the hardness of the molded homogeneous polishing body.

4348. The method of claim 4237, wherein the entire end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body.

4449. The method of claim 4237, wherein only an inner portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body.

4550. The method of claim 4237, wherein the molded homogeneous polishing body comprises a thermoset, closed cell polyurethane material.

4651. The method of claim 4237, wherein the polishing surface comprises a pattern of grooves disposed in the polishing surface and formed from the lid of the second formation mold.

4752. A method of fabricating a polishing pad for polishing a semiconductor substrate, the method comprising:

placing a support structure in a first formation mold;

providing a detection region precursor mixture in the first formation mold, above the support structure;

forming a partially cured end-point detection region precursor by heating the detection region precursor mixture in the first formation mold, the partially cured end-point detection region precursor coupled to the support structure;

positioning the support structure and the partially cured end-point detection region precursor on a recessed receiving region of a lid of a second formation mold by coupling the support structure to the recessed receiving region of the lid;

providing a polishing pad precursor mixture in the second formation mold;

moving, by bringing together the lid and a base of the second formation mold, the partially cured end-point detection region precursor into the polishing pad precursor mixture;

heating the polishing pad precursor mixture and the partially cured end-point detection region precursor to provide a molded homogeneous polishing body covalently bonded with a cured end-point detection region precursor, the molded homogeneous polishing body having a polishing surface and a back surface, and the end-point detection region coupled to the support structure; and

removing the support structure from the end-point detection region.

4853. The method of claim 5247, further comprising:

subsequent to the heating, recessing the cured end-point detection region precursor relative to the back surface of the molded homogeneous polishing body to provide an end-point detection region disposed in and covalently bonded with the molded homogeneous polishing body.

4954. The method of claim 5247, wherein the support structure comprises a rigid epoxy board.

5055. The method of claim 5449, wherein providing the detection region precursor mixture in the first formation mold comprises providing the detection region precursor mixture on a polymer film adhered to the support structure.

5156. The method of claim 5550, wherein coupling the support structure to the recessed receiving region of the lid comprises adhering the support structure to the recessed receiving region with a piece of two-sided tape.

5257. The method of claim 5348, wherein the recessing is performed by routing out a portion of the cured end-point detection region precursor.

5358. The method of claim 5348, wherein the partially cured end-point detection region precursor includes a sacrificial layer, and wherein the recessing is performed by removing the sacrificial layer.

5459. The method of claim 5247, wherein the end-point detection region comprises a material different from the molded homogeneous polishing body.

5560. The method of claim 5954, wherein the end-point detection region is a local area transparency (LAT) region.

5661. The method of claim 5954, wherein the end-point detection region is an opaque region having a hardness different from the hardness of the molded homogeneous polishing body.

5762. The method of claim 5348, wherein the entire end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body.

5863. The method of claim 5348, wherein only an inner portion of the end-point detection region is recessed relative to the back surface of the molded homogeneous polishing body.

5964. The method of claim 5247, wherein the molded homogeneous polishing body comprises a thermoset, closed cell polyurethane material.

6065. The method of claim 5247, wherein the polishing surface comprises a pattern of grooves disposed in the polishing surface and formed from the lid of the second formation mold.