CLAIMS:

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

providing, in a formation mold, a foundation layer and a mixture formed from mixing a set of polymerizable materials, the foundation layer having a transparent region;

coupling a pattern of protrusions of the formation mold with the mixture; and,

with the pattern of protrusions coupled with the mixture,

at least partially curing the mixture to form a molded homogeneous polishing surface layer directly on the foundation layer, the molded homogeneous polishing surface layer comprising a pattern of grooves corresponding to the pattern of protrusions of the formation mold; and

forming an aperture or opening in the polishing surface layer, aligned with the transparent region of the foundation layer,

wherein the aperture or opening is formed during formation of the polishing surface layer.

2. The method of claim 1, further comprising:

removing the foundation layer having the molded homogeneous polishing surface layer formed thereon from the formation mold when the extent of curing is sufficient to maintain geometry of the molded homogeneous polishing surface layer but insufficient for the molded homogeneous polishing surface layer to withstand mechanical stress.

3. The method of claim 2, wherein the foundation layer extends beyond the molded homogeneous polishing surface layer.

4. The method of claim 3, wherein removing the foundation layer having the molded homogeneous polishing surface layer formed thereon from the base of the formation mold comprises taking hold of the foundation layer but not the molded homogeneous polishing surface layer.

5. The method of claim 3, further comprising:

cutting away the portion of the foundation layer that extends beyond the molded homogeneous polishing surface layer.

6. The method of claim 1, wherein the molded homogeneous polishing surface layer extends beyond the foundation layer.

7. The method of claim 1, wherein at least partially curing the mixture comprises heating both the mixture and the foundation layer.

8. The method of claim 1, further comprising:

removing the molded homogeneous polishing surface layer from the foundation layer; and

forming a second homogeneous polishing surface layer on the foundation layer.

9. The method of claim 1, wherein providing the foundation layer in the formation mold comprises first removing a previously formed polishing surface layer from the foundation layer.

10. The method of claim 1, wherein providing the foundation layer in the formation mold comprises first roughening a surface of the foundation layer.

11. The method of claim 1, wherein forming the molded homogeneous polishing surface layer comprises forming a thermoset polyurethane material.

12. The method of claim 1, wherein mixing the set of polymerizable materials further comprises adding a plurality of porogens to the set of polymerizable materials to form a plurality of closed cell pores in the molded homogeneous polishing surface layer, each closed cell pore having a physical shell.

13. The method of claim 1, wherein mixing the set of polymerizable materials further comprises injecting a gas into the set of polymerizable materials, or into a product formed there from, to form a plurality of closed cell pores in the molded homogeneous polishing surface layer, each closed cell pore having no physical shell.

14. The method of claim 1, wherein mixing the set of polymerizable materials comprises mixing an isocyanate and an aromatic diamine compound.

15. The method of claim 1, wherein mixing the set of polymerizable materials further comprises adding an opacifying particle filler to the set of polymerizable materials to form an opaque molded homogeneous polishing surface layer.

16. The method of claim 1, further comprising:

further curing the molded homogeneous polishing surface layer by heating the foundation layer having the molded homogeneous polishing surface layer formed thereon in an oven.

17. The method of claim 1, wherein a polishing pad comprising the foundation layer having the molded homogeneous polishing surface layer formed thereon is used for performing a polishing process without performing a backside cut of the foundation layer.

18. The method of claim 1, wherein at least partially curing the mixture forms the molded homogeneous polishing surface layer covalently bonded with the foundation layer.

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

providing, in a formation mold, a foundation layer and a mixture formed from mixing a set of polymerizable materials, the foundation layer having a transparent region;

coupling a pattern of protrusions of the formation mold with the mixture; and,

with the pattern of protrusions coupled with the mixture,

at least partially curing the mixture to form a molded homogeneous polishing surface layer directly on the foundation layer, the molded homogeneous polishing surface layer comprising a pattern of grooves corresponding to the pattern of protrusions of the formation mold;

removing the foundation layer having the molded homogeneous polishing surface layer formed thereon from the formation mold when the extent of curing is sufficient to maintain geometry of the molded homogeneous polishing surface layer but insufficient for the

molded homogeneous polishing surface layer to withstand mechanical stress; and

forming an aperture or opening in the polishing surface layer, aligned with the transparent region of the foundation layer.

20. The method of claim 19, wherein the aperture or opening is formed subsequent to formation of the polishing surface layer.

21. The method of claim 19, wherein the foundation layer extends beyond the molded homogeneous polishing surface layer.

22. The method of claim 21, wherein removing the foundation layer having the molded homogeneous polishing surface layer formed thereon from the base of the formation mold comprises taking hold of the foundation layer but not the molded homogeneous polishing surface layer.

23. The method of claim 21, further comprising:

cutting away the portion of the foundation layer that extends beyond the molded homogeneous polishing surface layer.

24. The method of claim 19, wherein the molded homogeneous polishing surface layer extends beyond the foundation layer.

25. The method of claim 19, wherein at least partially curing the mixture comprises heating both the mixture and the foundation layer.

26. The method of claim 19, further comprising:

removing the molded homogeneous polishing surface layer from the foundation layer; and

forming a second homogeneous polishing surface layer on the foundation layer.

27. The method of claim 19, wherein providing the foundation layer in the formation mold comprises first removing a previously formed polishing surface layer from the foundation layer.

28. The method of claim 19, wherein providing the foundation layer in the formation mold comprises first roughening a surface of the foundation layer.

29. The method of claim 19, wherein forming the molded homogeneous polishing surface layer comprises forming a thermoset polyurethane material.

30. The method of claim 19, wherein mixing the set of polymerizable materials further comprises adding a plurality of porogens to the set of polymerizable materials to form a plurality of closed cell pores in the molded homogeneous polishing surface layer, each closed cell pore having a physical shell.

31. The method of claim 19, wherein mixing the set of polymerizable materials further comprises injecting a gas into the set of polymerizable materials, or into a product formed there from, to form a plurality of closed cell pores in the molded homogeneous polishing surface layer, each closed cell pore having no physical shell.

32. The method of claim 19, wherein mixing the set of polymerizable materials comprises mixing an isocyanate and an aromatic diamine compound.

33. The method of claim 19, wherein mixing the set of polymerizable materials further comprises adding an opacifying particle filler to the set of polymerizable materials to form an opaque molded homogeneous polishing surface layer.

34. The method of claim 19, further comprising:

further curing the molded homogeneous polishing surface layer by heating the foundation layer having the molded homogeneous polishing surface layer formed thereon in an oven.

35. The method of claim 19, wherein a polishing pad comprising the foundation layer having the molded homogeneous polishing surface layer formed thereon is used for performing a polishing process without performing a backside cut of the foundation layer.

36. The method of claim 19, wherein at least partially curing the mixture forms the molded homogeneous polishing surface layer covalently bonded with the foundation layer.