[0091] For these configurations and for purposes of the specification, the bias angle θ equals the average angle of the curved biased grooves in relation to the bisect line represented by a dashed line. One method for measuring bias angle as seen in Figure 8 is to draw an imaginary line 8-8 that connects adjacent radial feeder grooves 820 and 830 along a single curved biased groove, then measure the angle of intersection (θ) or bias angle with dashed bisect line B_8. Similarly, for Figure8A, imaginary line 8a-8a connects adjacent radial feeder grooves 870 and 872 along a single curved bias groove, then measuring the angle of intersection with dashed bisect line B_{8a} equals the bias angle, θ. It is important that at least a majority of each curved bias segment have either an inward or outward angle. Advantageously, a majority of the bias grooves have the same bias. This is because having an inward biased groove portion with an outward biased groove portion will tend to cancel each other out with respect to removal rate. Advantageously, all the bias segments have either an inward or outward bias.

[0092] Referring to Figures 9, polishing pad 900 has curved radial feeder grooves 910, 912, 914 and 916. The feeder grooves 910, 912, 914 and 916 curve counter counterclockwise to improve fluid flow for clockwise rotation of polishing pad 900. This shape accelerates outward flow of the polishing fluid to improve polishing fluid distribution to outer bias grooves 920 during clockwise rotation and decelerates outward flow to decrease polishing fluid distribution to outer bias grooves 920 during counterclockwise rotation. Alternatively, the radial feeder grooves could curve in a clockwise direction (not shown) for the opposite impact. This shape decelerates outward flow of the polishing fluid to improve polishing fluid distribution to outer bias grooves 920 during counterclockwise rotation and accelerates outward flow to decrease polishing fluid distribution to outer bias grooves 920 during clockwise rotation.

[0093] Measuring bias angle for Figure 9 having curved radial feeder grooves 914 and 916, requires drawing of dashed radial lines Ra and Rb with imaginary bisect line B_9 that bisects dashed radial lines Ra and Rb. This illustrates the bias angle θ for outward bias groove 930 that intersects bisect line B_9. Chords Ra_1 and Rb_1 have equal length and are parallel radial lines Ra and Rb, respectively. A dashed line Ra_1 –Rb_1 connects ends of chords Ra_1 and Rb_1 and intersects with bisect line B_9 at bias groove 930. The bias angle for groove 930 is the angle between bisect line B_9 and groove 930 or θ. This embodiment has a constant θ along each bias groove and throughout the entire polishing region.

[0094] Referring to Figure 10, polishing pad 1000 includes curved radial feeder grooves 1010, 1012, 1014 and 1016 combined with outward biased curved grooves 1020. In

CLAIMS:

1. A method for polishing or planarizing a wafer of at least one of semiconductor, optical and magnetic substrates, the method comprising the following:

rotating a polishing pad, the polishing pad having a polishing layer having a polymeric matrix and a thickness, the polishing layer including a center, an outer edge and a radius extending from the center to the outer edge of the polishing pad; radial feeder grooves in the polishing layer separating the polishing layer into polishing regions, the polishing regions having a bias for adjusting residence time under the wafer, the bias having a bias angle θ between a bisect line bisecting polishing regions and biased grooves connecting adjacent feeder grooves, the bias angle θ being either an inward bias angle θ sloped inward toward the center of the polishing pad or an outward bias angle θ sloped outward toward the outer edge of the polishing pad, a majority of the biased grooves sweeping the wafer in the same direction under the wafer, the radial feeder grooves extending at least from a location adjacent the center to a location adjacent the outer edge; and each polishing region including a series of biased grooves connecting a pair of adjacent radial feeder grooves, the majority of the biased grooves having either an inward bias toward the center or an outward bias toward the outer edge of the polishing pad, both the inward and outward biased grooves moving polishing fluid toward the outer edge of the polishing pad and away from the wafer depending upon inward bias or outward bias and the direction of rotation of the polishing pad for increasing residence time of polishing fluid with outward flow of the polishing fluid in the series of biased grooves in the polishing regions under the wafer;

distributing polishing fluid onto the rotating polishing pad and into the radial feeder grooves and the series of biased grooves; and

pressing and rotating the wafer against the rotating polishing pad for multiple rotations of the polishing pad at a fixed distance from the center of the polishing pad, the wafer being closer to the outer edge of the polishing pad than the center of the polishing pad to increase removal rate of at least one component of the wafer and wherein non-alignment of bias grooves between adjacent polishing regions facilitates polishing fluid flow down the radial feeder grooves to improve slurry distribution.

2. The method of claim 1 wherein rotating the polishing pad sends used polishing fluid through a portion of the series of biased grooves over the outer edge of the polishing pad to allow flow of new polishing fluid under the wafer.

3. The method of claim 1 wherein the series of biased grooves represent parallel grooves that increase residence time of the polishing fluid under the wafer.

4. The method of claim 1 wherein rotating the polishing pad alternates the wafer between being over one radial feeder groove and being over two radial feeder grooves.

5. A method for polishing or planarizing a wafer of at least one of semiconductor, optical and magnetic substrates, the method comprising the following:

rotating a polishing pad, the polishing pad having a polishing layer having a polymeric matrix and a thickness, the polishing layer including a center, an outer edge and a radius extending from the center to the outer edge of the polishing pad; radial feeder grooves in the polishing layer separating the polishing layer into polishing regions, the polishing regions having a bias for adjusting residence time under the wafer, the bias having a bias angle θ between a bisect line bisecting polishing regions and sloped grooves connecting adjacent feeder grooves, the bias angle θ being either an inward bias angle θ sloped inward toward the center of the polishing pad or an outward bias angle θ sloped outward toward the outer edge of the polishing pad, a majority of the biased grooves sweeping the wafer in the same direction under the wafer, the polishing regions being circular sectors defined by two adjacent radial feeder grooves, a bisect line bisecting the polishing regions, the radial feeder grooves extending at least from a location adjacent the center to a location adjacent the outer edge; and each polishing region including a series of biased grooves connecting a pair of adjacent radial feeder grooves, the majority of the biased grooves having either an inward bias toward the center of the polishing pad at an angle of 20° to 85° from the bisect line or an outward bias toward the outer edge of the polishing pad at an angle of 95° to 160° from the bisect line, both the inward and outward biased grooves moving polishing fluid toward the outer edge of the polishing pad and away from the wafer depending upon inward bias or outward bias and the direction of rotation of the polishing pad for increasing residence time of polishing fluid with outward flow of the polishing fluid in the series of biased grooves in the circular sectors under the wafer;

distributing polishing fluid onto the rotating polishing pad and into the radial feeder grooves and the series of biased grooves; and

pressing and rotating the wafer against the rotating polishing pad for multiple rotations of the polishing pad at a fixed distance from the center of the polishing pad, the wafer being closer to the outer edge of the polishing pad than the center of the polishing pad to increase removal rate of at least one component of the wafer and wherein non-alignment of bias grooves between adjacent polishing regions facilitates polishing fluid flow down the radial feeder grooves to improve slurry distribution.

6. The method of claim 5 wherein rotating the polishing pad sends used polishing fluid through a portion of the series of biased grooves over the outer edge of the polishing pad to allow flow of new polishing fluid under the wafer.

7. The method of claim 5 wherein the series of biased grooves represent parallel grooves that increase residence time of the polishing fluid under the wafer.

8. The method of claim 5 wherein rotating the polishing pad alternates the wafer between being over one radial feeder groove and being over two radial feeder grooves.