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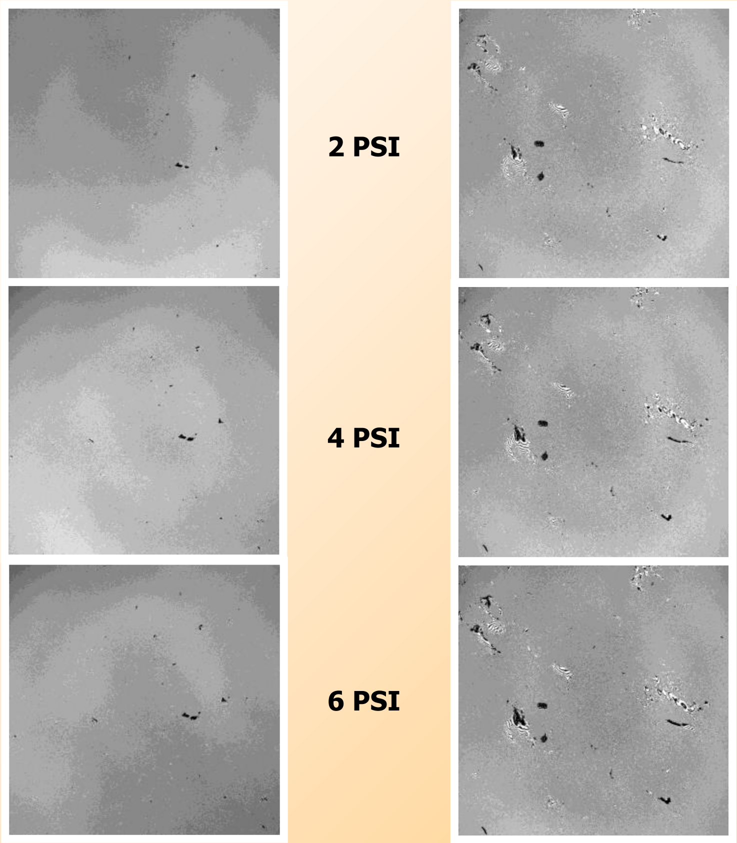
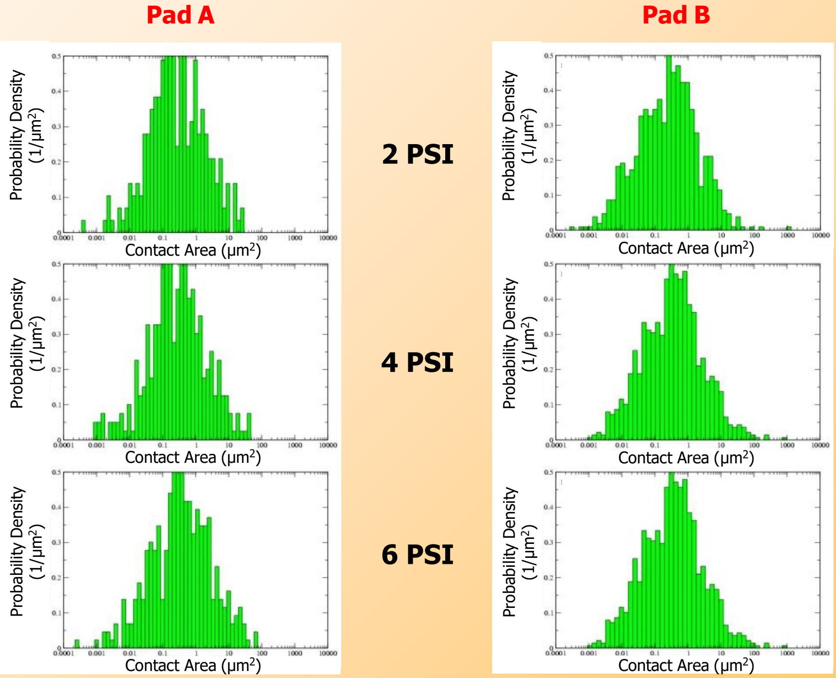
Pad Micro-Topography Analysis

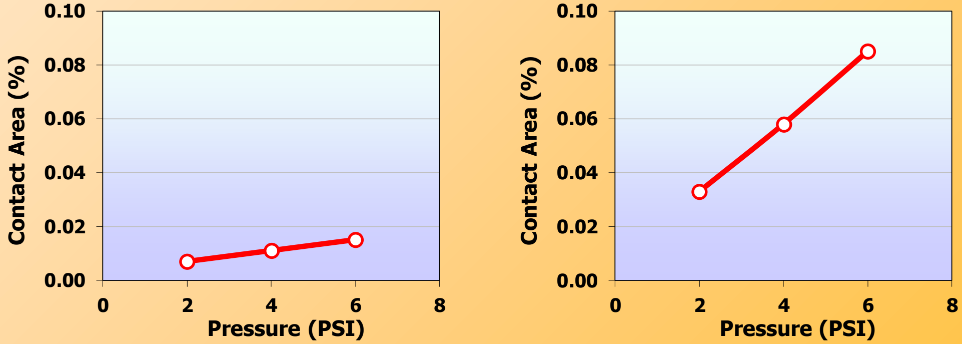
Araca, Inc. has developed the technology using laser confocal microscopy to measure and analyze pad-wafer contact area (under load) and pad topography (under no load).



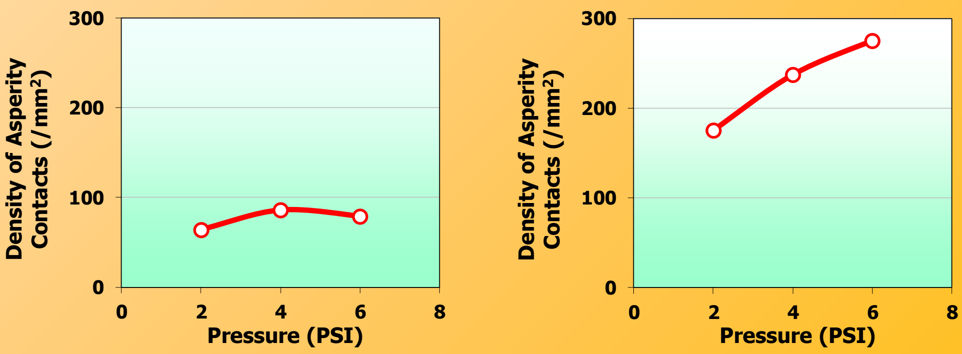
Contact Area Images for Pad A (left) and Pad B (right)



Contact Area Probability Density Function



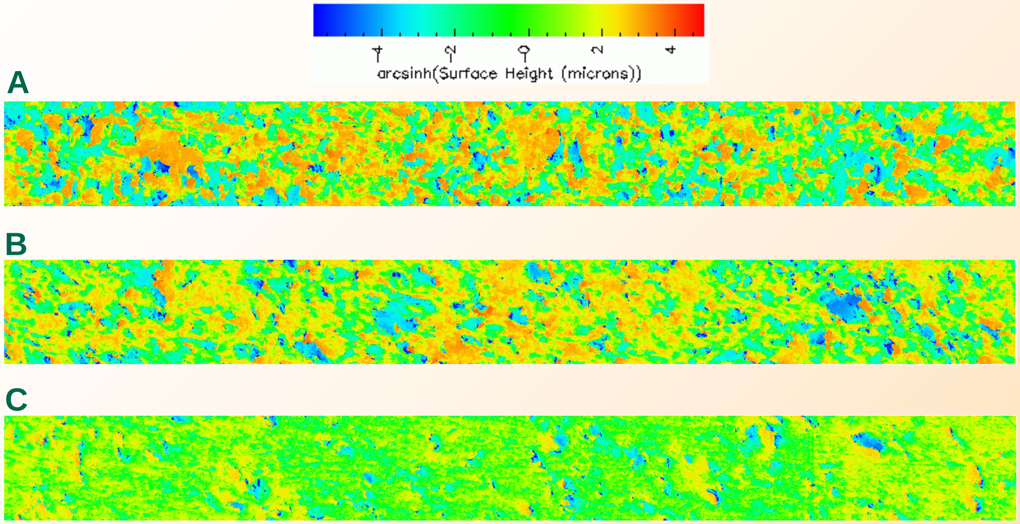
Contact Area for Pad A (left) and Pad B (right)



Contacting Asperity Density for Pad A (left) and Pad B (right)

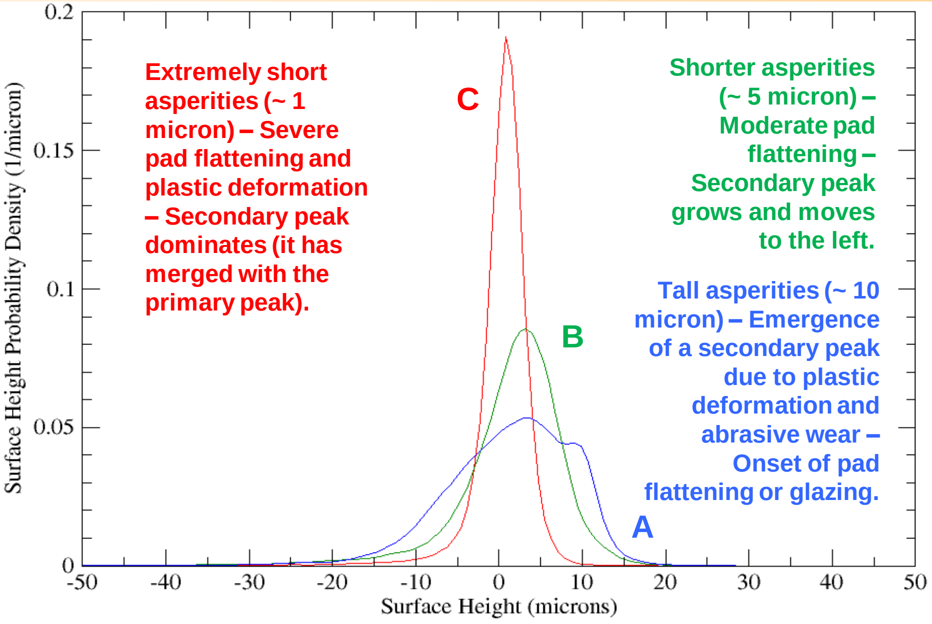
Pad contact area and summit density are critical factors affecting removal rate, dishing, erosion, oxide loss, pad life, and wafer-level defects. We employ a modified Zeiss LSM-880 confocal microscope (see below) to determine key pad microtextural characteristics.

Pad Topography



A → B → C … Increasing plastic shear hides pores. Surfaces become increasingly flat.

Surface Height PDF



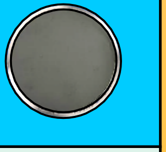
Extremely short asperities (~ 1 micron) – Severe pad flattening and plastic deformation – Secondary peak dominates (it has merged with the primary peak).

Shorter asperities (~ 5 micron) – Moderate pad flattening – Secondary peak grows and moves to the left.

Tall asperities (~ 10 micron) – Emergence of a secondary peak due to plastic deformation and abrasive wear – Onset of pad flattening or glazing.

Confocal microscopy analysis:

- **Topography.**
- **Asperity height probability density function.**
- **Mean asperity height.**
- **Mean asperity curvature.**
- **Wafer-pad contact area.**
- **Wafer-pad near contact area.**
- **Contact summit density.**

Pad-Wafer Contact Parameter	A 		B 		C 
Mean percentage contact area at 2 PSI (%)	0.016	>	0.0073	~	0.0051
Mean contact density at 2 PSI (contact count per mm^2)	220	>>	55	>	29