

## Planaredge: Entegris new and innovative retaining ring approach

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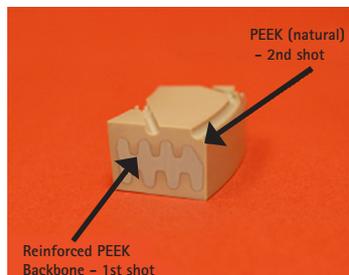
Improving CMP performance has always been a challenge. Over the past few years, end-users have been working on different consumables (slurry, pads, conditioners, filters...) in order to improve yield performance, decrease tool down time and improve CoO.



However, some consumables that have a major impact on the process performance have never been really studied, Retaining Rings being one of those.

The primary function of the retainer ring is to avoid wafer slippage. It is in direct contact with slurry, pad, wafers and it plays a major role in fluid transportation underneath the wafers as well as by-product evacuation, pad heating, enhanced polish rate and wafer edge uniformity... In this respect, having a full control on quality, product consistency and ionic contamination is essential to minimize process variation.

Entegris introduced **Planaredge** at the Semicon West exhibition in July 2007, a new and innovative Retaining Ring approach.

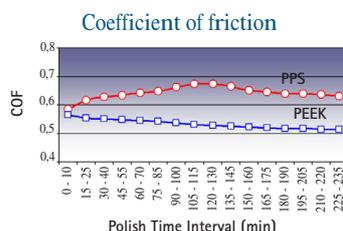


Based on a unique co-molding design, a reinforced PEEK backbone has been selected to replace the stainless steel ring, to eliminate metal parts in this wet process, thus avoiding potential cross contamination. This material has excellent flexural and tensile properties at very high temperatures and electrostatic discharge.

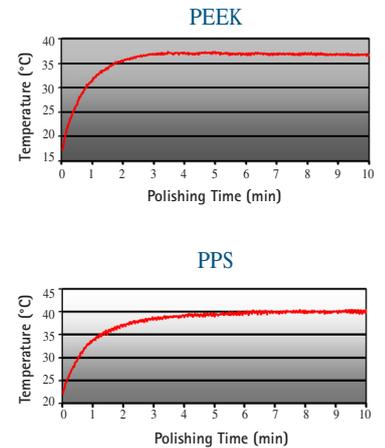
The outer material, natural PEEK 450G (Polyetheretherketane) was selected for its good technical and mechanical properties showed during the numerous laboratory tests performed to quantify its tribological, kinetics, thermal and flow characteristics vs. PPS (Polyphenylene Sulfide)

### Planaredge - test performance

► CoF measured during the tests were lower for Planaredge PEEK, hence a lower temperature at the pad surface.

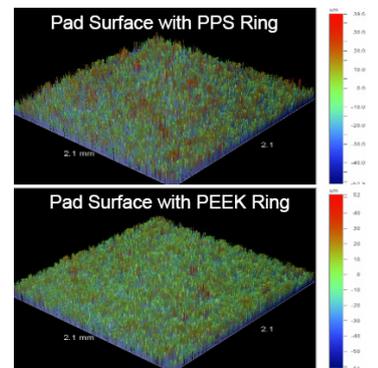


► Micrometry exhibited lower wear rate for PEEK under the same process conditions, leading to a longer consumables life. Cost associated to the replacement of the Ring include break-in time, slurry consumption, dummy wafers, labor and production downtime... this represents several times the cost of the ring itself.



► During polishing, a pad is subjected to conditioning to mechanically abrade the pad and refresh the surface. Conditioning is necessary to avoid glazing, keep the removal rate constant and control defectivity. One of the surface metrics to control the steady state of the pad surface is the roughness (Ra).

Wyco interferometer analyses demonstrated a smoother surface for pads polished with the Co-molded Planaredge PEEK ring. Narrower surface roughness distribution (less peaks and valleys) is preferred for within-die uniformity and dishing, and a more consistent pad surface.



As a polymer molding expert Entegris controls the supply chain from formulation and compounding to the final post-molding micro machining steps. This insures constant product availability in high volume manufacturing.

The studies being carried out by Entegris to better understand the tribological properties of the retaining rings, are leading to the development of new designs with enhanced surface preparation that reduce break-in time. ■

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