SARFUS: Characterization of adhesive nanometric layer on SiO2 surface.

In this work, two well-known protective adhesives designed for microelectronic applications have been studied with the Sarfus technique. Theses adhesives are described as providing clean removal during masking operations but the presence of nanometric organic layers is shown.

Introduction

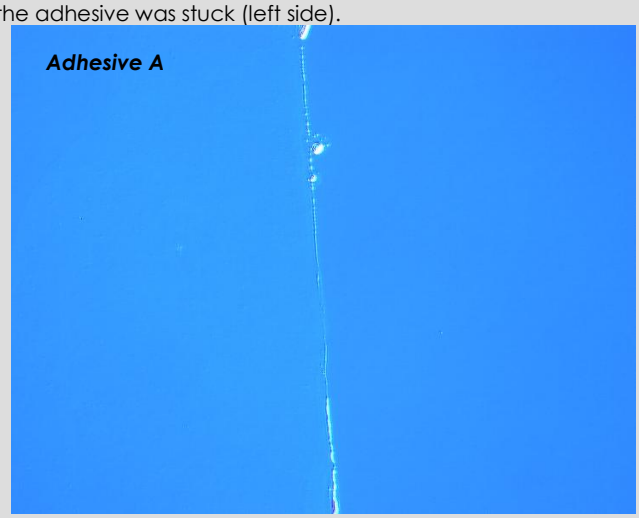
More and more applications in various fields such as microelectronic and nanotechnology need the use of ultra clean protective adhesives. Efforts have been done by companies to provide such adhesives that let no contaminant on surface after unsticking. In this study, we have controlled the cleanliness of SiO2 surfaces protected by adhesives being described as non-surface contaminant.

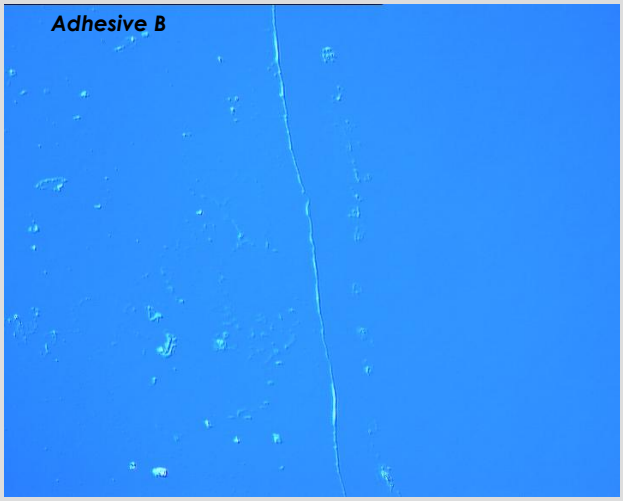
Experimental part

Two commercial protective adhesives (noted A and B) coming from a major company are studied. They are widely used in the microelectronic field and are considered as non-surface contaminant. Both adhesives are manually stuck on half a Standard Surf (topmost layer: SiO2) and unstuck after 30 seconds.

Results

Sarfus images on SiO2 surface (Figures 1 and 2) show that a nanometric layer is present on the part of the surface where the adhesive was stuck (left side).





Figures 1and 2: Sarfus images of the organic layer (left side) for adhesives A and B on the standard Surf.

The layer is very homogenous for adhesive A and we were not able to observe its presence when the adhesive is stuck on the entire surface. Adhesive B displays some nanometric / microscopic particles on the surface. Some of them are also present few micrometers next to the stuck area. At the frontier of the layer, an over-thickness of matter is visible (thickness from 10 to 15nm).

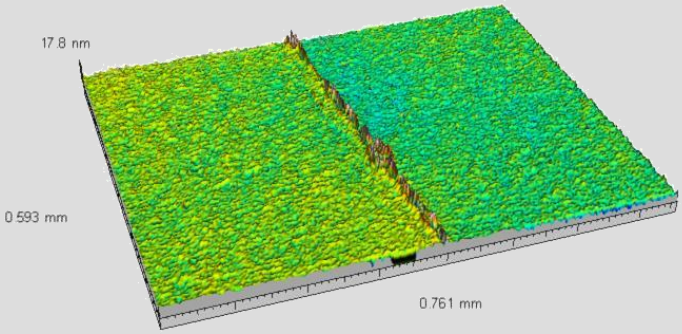


Figure 3: 3D Sarfus image of the residual organic layer (left part of the image) for adhesive A.

The mean optical thickness of the layer is about 1.2nm for adhesive A and about 0.9nm for adhesive B, respectively.

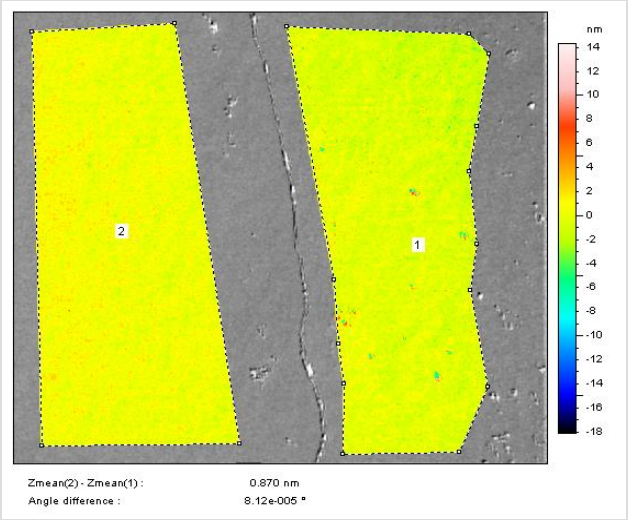


Figure 4: Step height measurement of the residual organic layer (left part of the image) for adhesive B with Sarfus.

Conclusions

Two commercial adhesives being described as non-surface contaminant have been analyzed. Sub-nanometric layers of about 1 nm as well as nanometric / microscopic particles has been easily and rapidly characterized by the Sarfus technique.

Contribution/advantages of Sarfus

- Operator level technique
- Non-invasive/non contact technique
- Extreme sensitivity (< 1 nm)
- Direct and fast sample analysis (< 1 second per image)
- Capacity to analyse soft material
- Work at atmospheric pressure
- No pre-treatment of the sample