What is claimed is:

1. A cleaning material with a functionalized surface for cleaning the contact elements and support structures of testing interfaces used for wafer level or package level IC semiconductor device testing, the cleaning material comprising:

a cleaning media having a cleaning media base reference plane and a plurality of functionalized microfeatures arranged in an array having a plurality of rows and a plurality of columns of functionalized microfeatures and each functionalized microfeature has a body with a width and a height, a spacing between each body and dimensional properties that optimize the cleaning media so that the contact area and surrounding support hardware are cleaned without modification or damage, each functionalized microfeature extending above the cleaning media base reference plane and the cleaning media having a plurality of abrasive particles having a Mohs Hardness of 7 or greater uniformly distributed within the body of each functionalized microfeature;

a cleaning layer applied across a top surface of the cleaning media having predetermined characteristics that clean contaminants from the pin contact elements and support hardware, the cleaning layer applied on top of all of the functionalized microfeatures and within the spacing between each functionalized microfeature down to the cleaning media base reference plane; and

one or more intermediate rigid or compliant underlayers underneath the cleaning media, wherein each underlayer has a modulus of elasticity range between more than 40-MPa to 600-MPa, each layer has a thickness between 25-um and 300-um and each layer has a hardness between 30 Shore A and 90 Shore A.

2. The cleaning material of claim 1, wherein the plurality of functionalized microfeature is one of uniformly shaped across the cleaning media and variably spaced across the cleaning media.

3. The cleaning material of claim 1, wherein the plurality of abrasive particles further comprises one or more kinds of particles selected from the group consisting of aluminum oxide, silicon carbide, and diamond.

4. The cleaning material of claim 1, wherein the cleaning layer further comprises a polymer layer that is 10 to 100 um thick that has a predetermined specific gravity, elasticity, tackiness, planarity, thickness and porosity.

5. The cleaning material of claim 1, wherein the cleaning layer further comprises a layer of abrasive polymer with a plurality of abrasive particles having a Mohs Hardness of 7 or greater and is 10 to 100 um thick across the top surface of the cleaning media.

6. The cleaning material of claim 1, wherein each positive functionalized microfeature is one of a micro-pyramid, a micro-column and a curved micro-pyramid.

7. The cleaning material of claim 1, wherein the cleaning layer is applied over the body of each positive microfeature wherein the body of each positive functionalized microfeature has a face and the cleaning layer is applied over the face of each positive functionalized microfeature.

8. The cleaning material of claim 1, wherein the cleaning layer has a flat top surface opposite the top surface of the cleaning media.

9. The cleaning material of claim 1, wherein each functionalized microfeatures extends above the cleaning media base reference plane in a range of 25 micrometers to 500 micrometers, has a top surface farthest away from the cleaning media base reference plane of more than 20 micrometers and the spacing between each functionalized microfeature is in the range from 50 micrometers and 250 micrometers.

10. The cleaning material of claim 1, wherein the cleaning layer further comprises a plurality of abrasive particles having a Mohs Hardness of 7 or greater with a thickness less than 10 um applied across a top surface of each positive functionalized microfeature and along the body of each positive functionalized microfeature.

11. The cleaning material of claim 10, wherein the plurality of abrasive particles are a blend of one or more types of particles selected from the group consisting of aluminum oxide, silicon carbide, and diamond.