

Genco ffe75

Defect reduction in thin films via dynamic plasma scanning



Semiconductor class cleanliness now possible for research sized deposition systems.

The use of 'clean' target sputtering offers many benefits for layer creation. For the last 30 years of PVD coating in the semiconductor industry, large area clean targets are key to create high uniformity and reduce defects on the devices.

Coating defects are generated from several sources related to the sputter target area:

Arcing as a result of charge build-up at defects on the target surface – defects can be particles, re-deposited areas on the target surface, areas on the target of different electrical conductivity, or areas of target poisoning in reactive processes.

Dust and debris on the parts of the target that are not sputtered sufficiently to remove the build-up of material in the centre or edges of the sputter target. This is a particular problem for ceramic and ferromagnetic targets, or targets running in a reactive gas mode.



Both of the above problems can be greatly reduced or removed if the sputter target contained no areas of re-deposit and had the same electrical properties. This can be achieved by rotating a magnetic field around the central axis of the source, as has been patented in different forms for the semiconductor field (1983- Fujitsu, 1985-Varian, 1990 -Applied Materials).

To achieve a similar result over a

large target diameter, such as 250-600mm, has already been established by Genco amongst other manufacturers. But until recently to achieve the same benefits over small target diameters has not been possible due to space constraints.



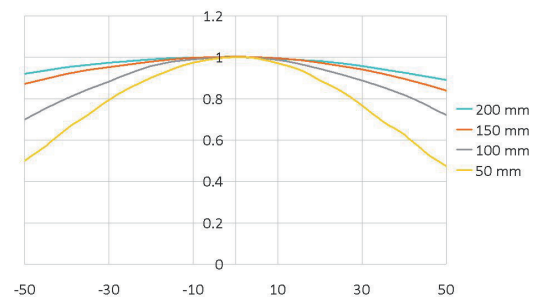
At the SVC show in 2013 Genco launched a circular FFE100 product that creates this clean target sputtering for a 100mm (4 inch) diameter target. Further development has now resulted in a FFE75 (3 inch) target with the addition of a variable tilted head. The product is aimed at the small scale research and development machines where multiple magnetrons typically need to fit into a small space, and the angle of the head is used to focus the flux to a static or revolving substrate area.



As can be seen in the pictures, the whole of the target is sputtered clean. The cleanliness of the target environment will yield the multiple benefits already described. Also, for small

target magnetron sources it is usually not possible to increase the target use by magnetic field shaping as the space available is too limited. But the use of a rotating plasma equalizes the erosion to some degree and improves the target use as well. Typically a 3mm bonded target will have a target usage of >40% (>50% with FFE100).

Cu deposition uniformity FFE75 at different T-S



For specialist developments such as reactive sputtering and Hipims power modes, this clean target enables easier process control and more stable processes as the power supply is 'helped' by the same electrical conductivity over the whole area of the target.

Another key feature for small scale development machines is the size of the mounting tube required. The FFE75 is mounted on a 38mm (1.5") tube and hence can be easily retrofitted into new or existing machines.



For further information on Genco's range of full face erosion circular magnetrons, contact sales@genco.com.