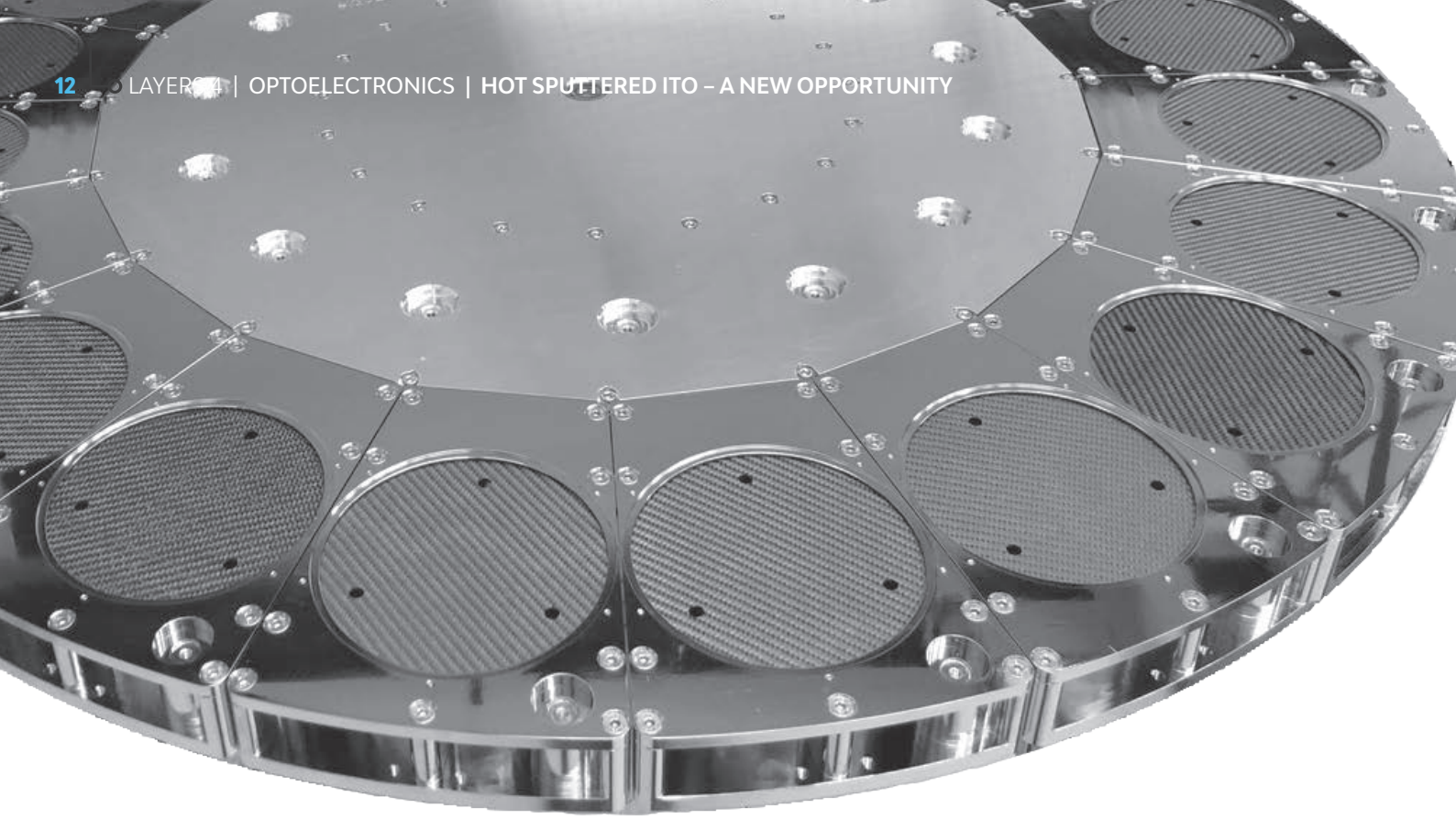


HOT SPUTTERED ITO – A NEW PROCESS IN THE LED PORTFOLIO

Evatec Product Marketing Manager **Franz Xaver Lenherr** introduces the new "hot turn table" available on CLUSTERLINE® RAD and the new possibilities it offers to LED manufacturers for ITO deposition.

New opportunities

Although cold ITO deposition processes may be well established, there are always new applications and products in development requiring different material properties.

Changing sputter deposition conditions for materials like ITO could bring other opportunities. Deposition temperature affects the grain shape and the combination of a temperature controlled hot ITO sputter process followed by an annealing process could enable new layer characteristics to be achieved including lower sheet resistance and higher transmission. Heating using traditional front side heating systems extends process times and reduces throughput which is problematic, but that issue can now be avoided with the new "hot turn table" available on CLUSTERLINE® RAD.

Take a look at the results

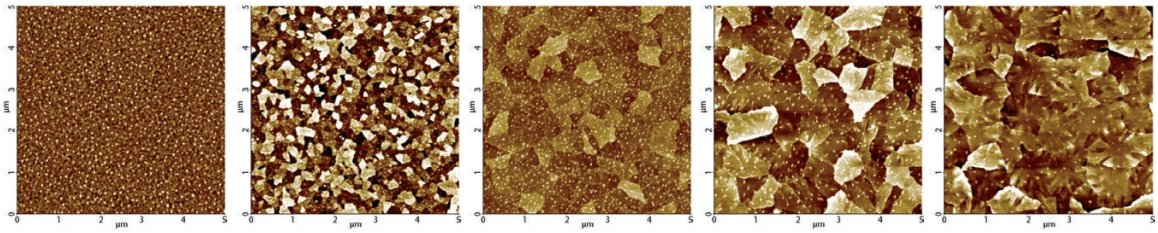
Figure 1 shows a range of typical hot sputtered films all deposited at the same temperature. Just like for cold processes varying other process conditions allows effective control of grain size.

Figure 2 compares the structures achieved for a cold process with anneal and a hot process without any subsequent anneal. Like always, layer deposition conditions and properties need to be optimised for each manufacturer and device structure and considered in relation to other downstream processes required, but in some cases running a hot process could eliminate the need for a subsequent post deposition anneal.

RESULTS

Grainsize variations for "HOT" sputtered films

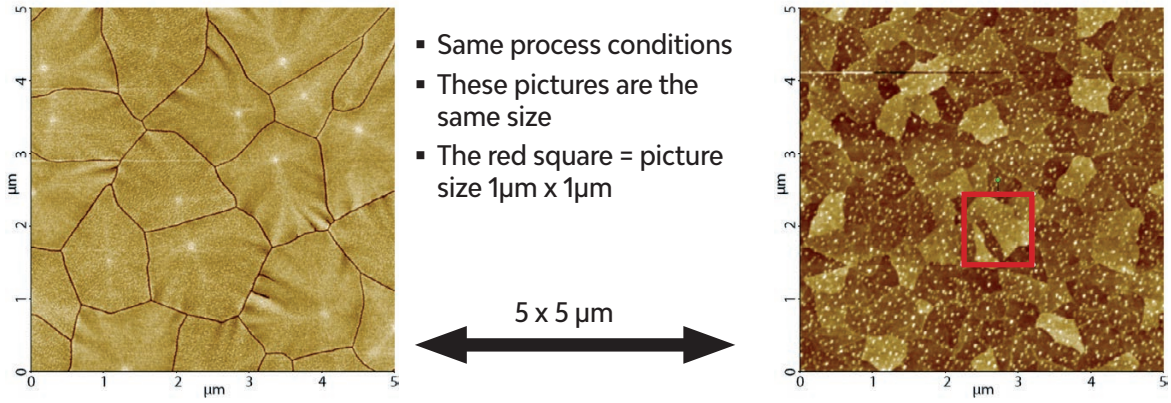
Fig. 1



After anneal: Cold sputtered

As deposited: Hot sputtered

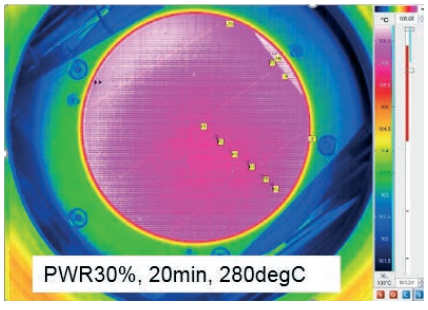
Fig. 2



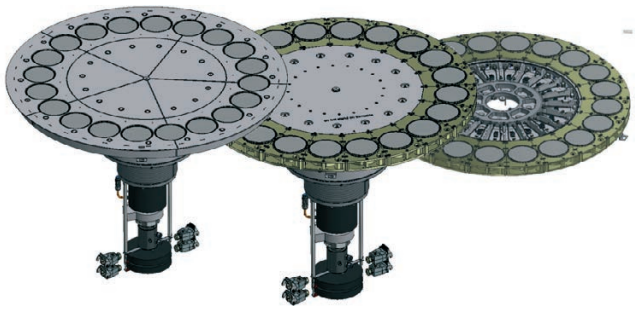
- Same process conditions
- These pictures are the same size
- The red square = picture size 1µm x 1µm

Developing a practical heating solution

The new "hot turn table" available on CLUSTERLINE® RAD is designed to facilitate such processes in mass production . An individual backside heater for every chuck ensures precise, repeatable surface temperature for each single substrate for tailoring of optimised layer structure. Each unit consist of three individual heating elements, resulting in best heating uniformity over the chuck diameter of 150 mm with variation of less than 3% at a temperature of 325°C over the total surface diameter.



Temperature uniformity of individual chuck at 280°C



Concept of the hot ITO turntable with individual chuck segments and its cooling supply.

The temperature itself can be adjusted between 100°C and 350°C max with a variation of maximum 5% over the full temperature range. Pyrometers in closed loop control measure, and adjust each individual chuck position around the turntable. Heating is confined to exactly where its needed and each chuck body also comes with integrated cooling

All CLUSTERLINE® RAD customers can benefit

This new turn table feature is configurable for any new CLUSTERLINE® RAD order. However we can also retrofit existing systems to the same configuration. To find out more simply contact your local Evatec Sales and Service Organisation.