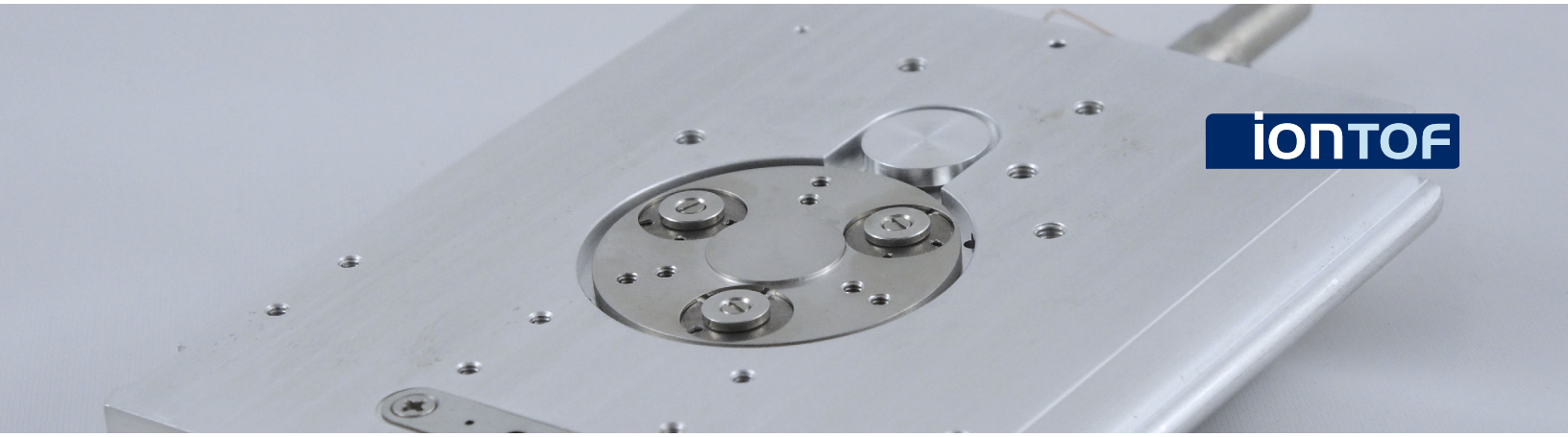

2 3

Fast Sample Rotation

Avoiding sample roughening

SIMS depth profiling of organic or inorganic samples may suffer from the formation of ion beam induced surface roughening.
This effect limits the achievable depth resolution and also leads to variation in erosion rates.
Sample roughening can effectively be avoided by using fast sample rotation during sputtering.

In this note, two depth profiles through a GaN/AlGaN multilayer system using 2 keV oxygen sputtering are presented.
The coating is composed of four 200 nm thick GaN layers and four 100 nm thick AlGaN layers.
Results obtained with and without sample rotation are compared.

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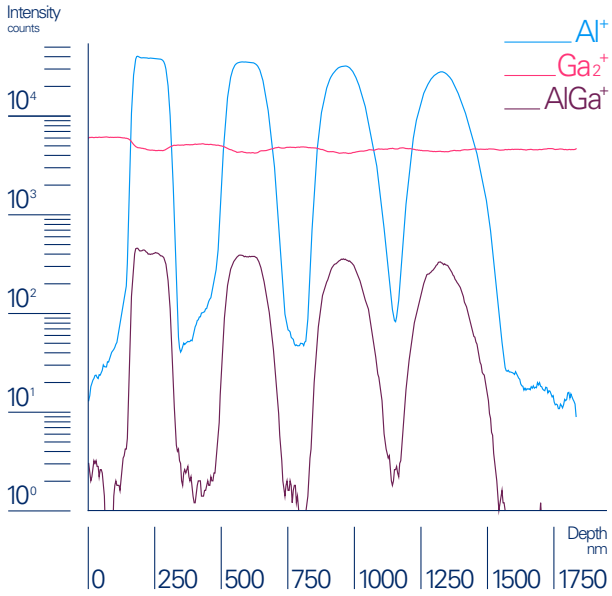
Higher depth resolution with fast sample rotation

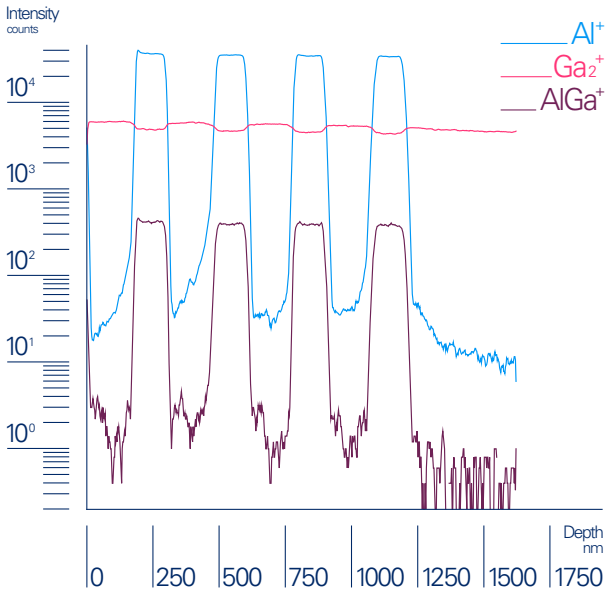
The depth profiles below clearly show that without sample rotation the sharpness of the Al and AlGaN layers decreases with increasing depth.

This is due to the formation of surface roughening during the measurement which progressively limits the depth resolution. The surface roughness also leads to a decreasing sputter rate during the profile. If the erosion rates were consistent for each layer, the end of the fourth Al layer should be at a depth of 1200 nm.

In contrast this interface is found at 1500 nm. The second profile demonstrates that fast sample rotation is fully able to solve both of these issues.



Depth Profile without Fast Sample Rotation
The depth scale was established by adjusting the depth of the end of the first AlGaN layer to 300 nm.



Depth Profile with Fast Sample Rotation
The depth scale was established by adjusting the depth of the end of the first AlGaN layer to 300 nm.