



## Introduction

Characterization of MOCVD wafer carriers has been extended with the addition of an UV PL system on the kSA Emissometer. This system uses a 365 nm LED focused at the wafer carrier and a filtered photodetector focused at the excitation point. The emitter/detector combination can be seen left of center in figure 1. The filter cuts off light for wavelengths shorter than 409 nm.

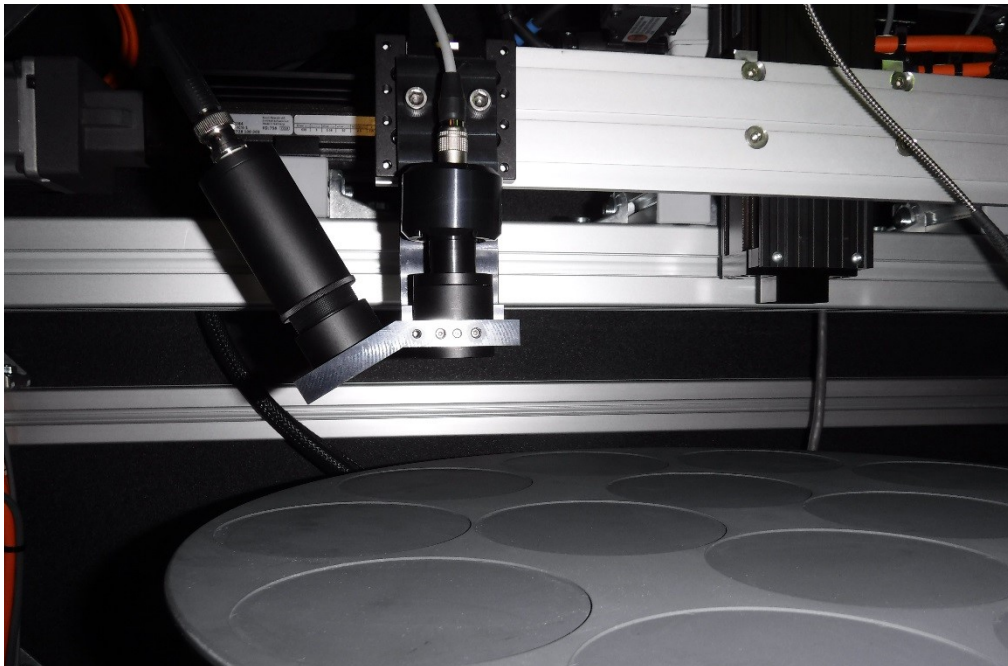


Figure 1 - View of UV light source and filtered photodetector.

The UV PL measurement tracks concurrent with the reflectivity/emissivity/height measurements and maps any features of residues and contaminants to the same positions mapped out with the standard analyses.

## Characterization Results

As a test of the UV PL, 3 samples were placed within pockets of a wafer carrier. These can be seen in the diffuse reflectance image in figure 2.

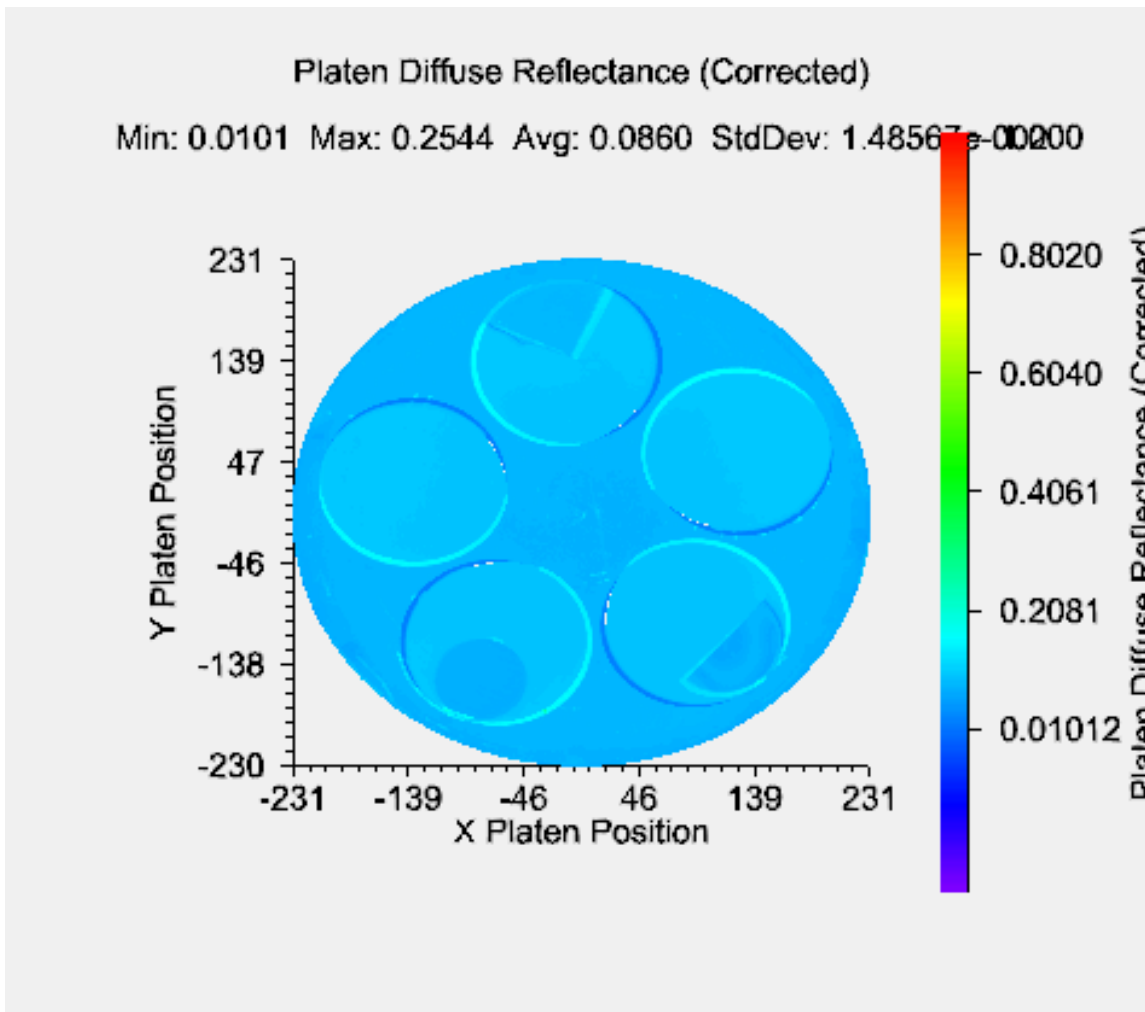


Figure 2 – Diffuse reflectance image of the 3 samples for UV PL measurement.

A 2" diameter SiC wafer, a small sector of a thin (~300 nm) film of AlN on a sapphire wafer, and a section of a ~1.5  $\mu\text{m}$  film of GaN on a sapphire wafer were placed as shown in figure 2.

Figure 3 displays the PL map. The GaN film emission saturates the detector. There is a general low-level background emission from the carrier itself and bright spots from dust specks, especially around the pocket edges. The SiC wafer looks darker than the background and the AlN section shows slightly more emission.

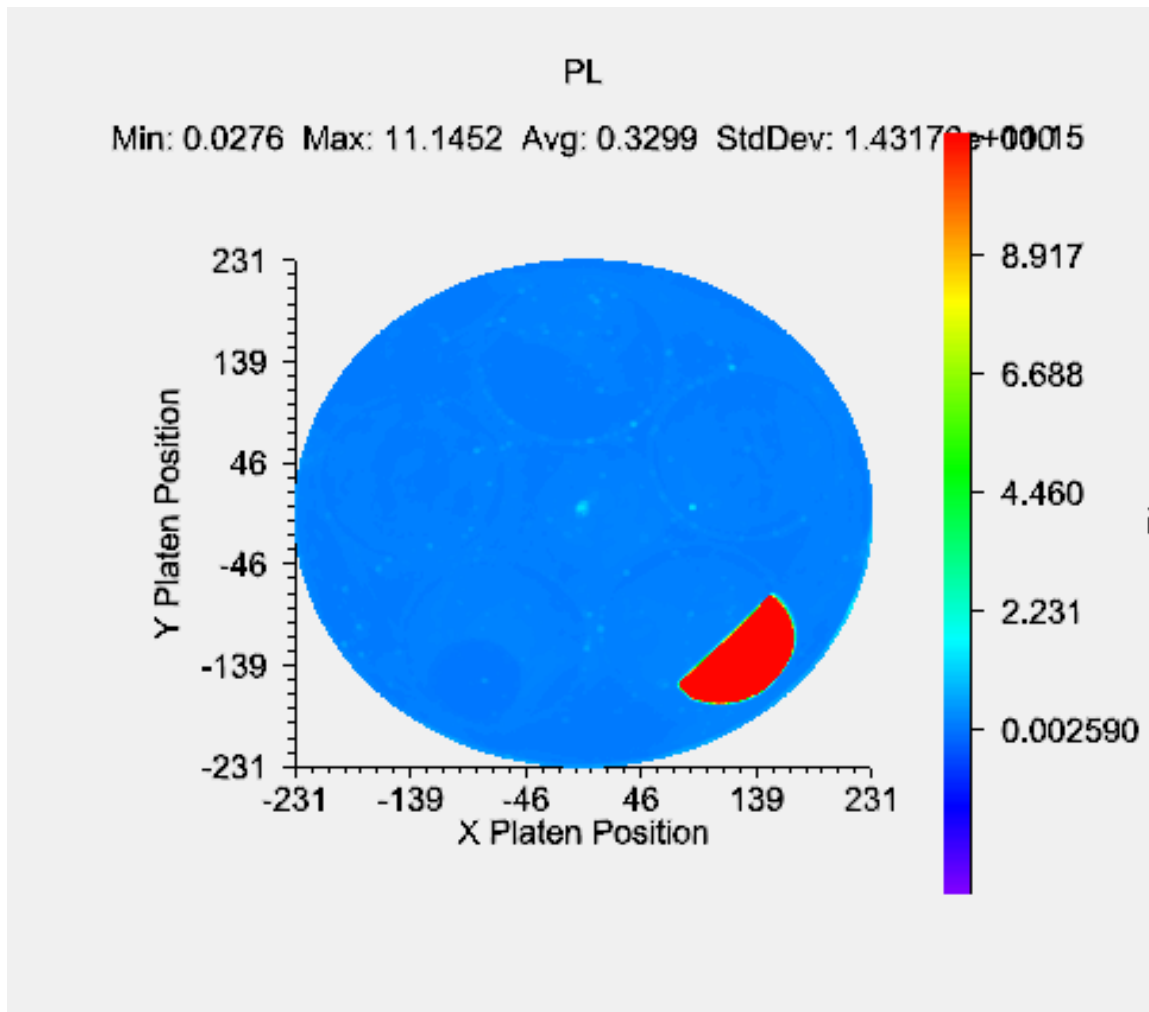
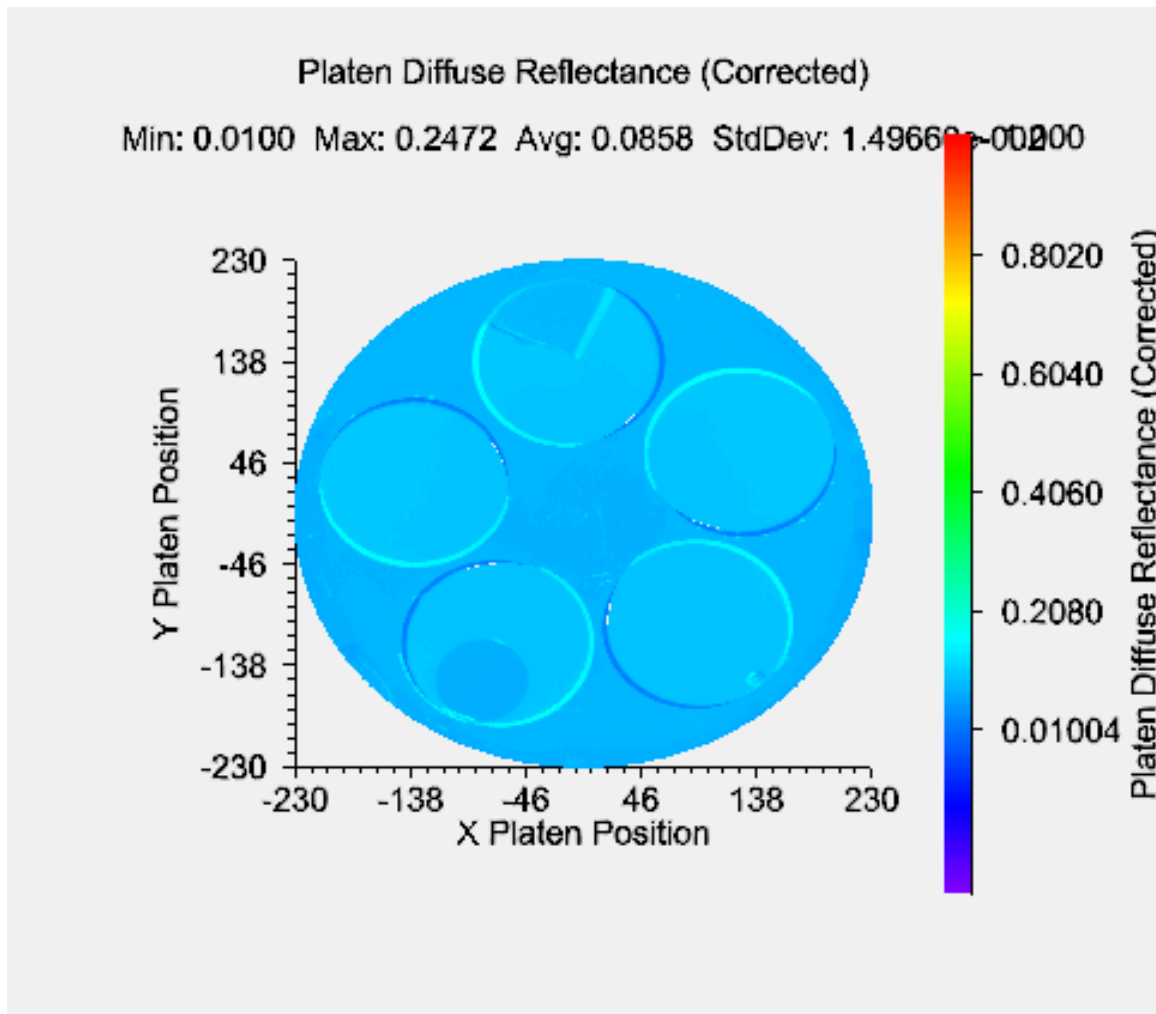


Figure 3 - UV PL emission from the carrier and samples.

We next removed the GaN sample in order to increase the UV excitation and see if the AlN can be excited. In place of the GaN sample, we added a 1 cm<sup>2</sup> AlN template. The AlN template can be seen in the lower right corner of the diffuse reflectance image in figure 4.



**Figure 4 – Diffuse reflectance image of UV PL samples with AlN template replacing GaN film on sapphire.**

The UV PL image can be seen in figure 5. Dust specks and towel lint show up as bright spots, many of which outline pocket edges. The SiC wafer is darker than the background from the carrier, so it appears that there is no emission from clean SiC. The emission from the carrier itself is probably from oil residues from handling and cleaning with alcohol. The AlN film wedge can be seen just slightly above the background in that pocket. The AlN template is as bright as the dust and lint specks.

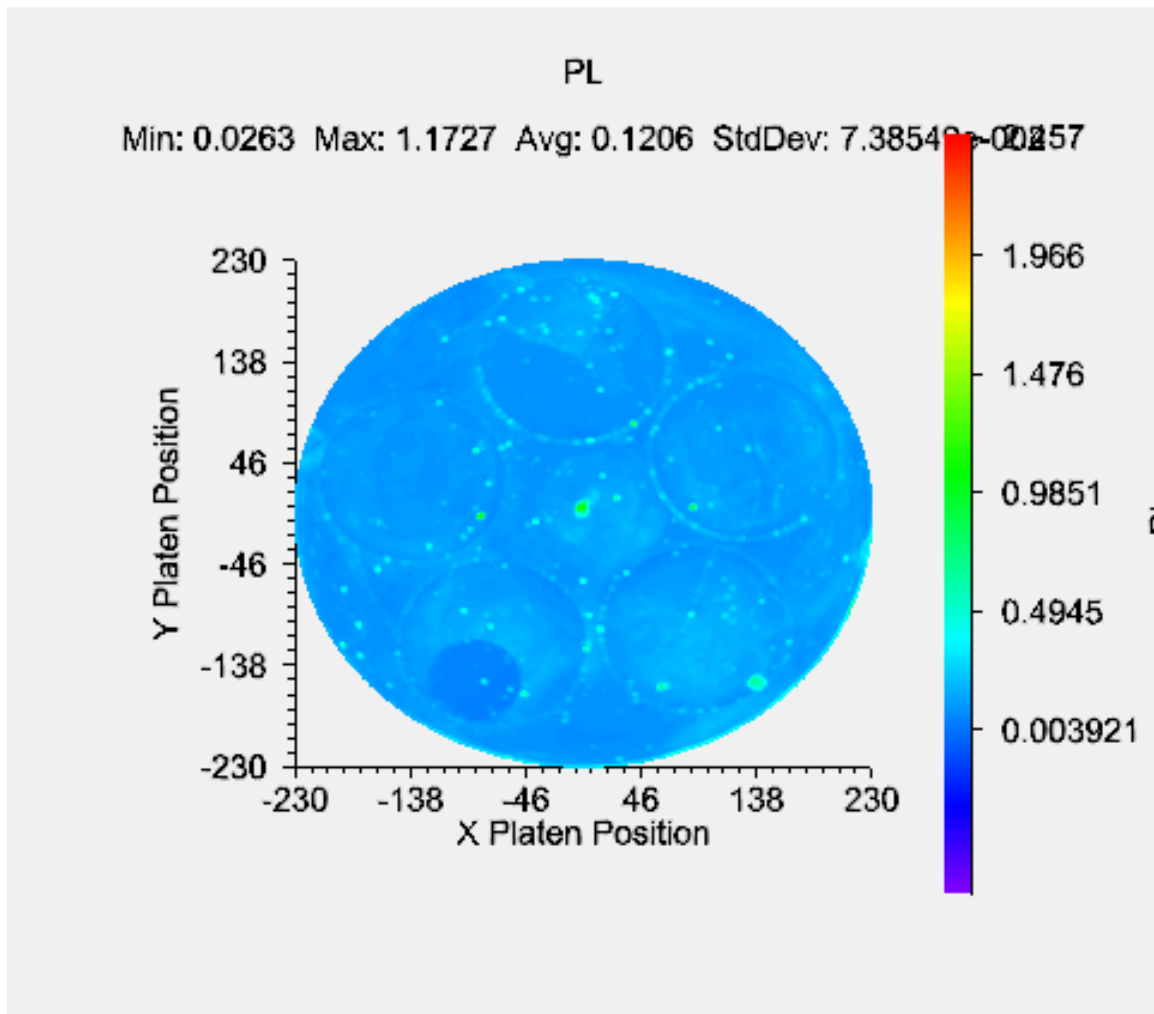


Figure 5 – UV PL emission from AlN as well as towel lint and other hydrocarbon residues.