

Degradation analysis of SiC and AlGaN based photodiodes

INTRODUCTION

The detection of UV radiation can be done with different types of photodiodes. Main distinguishing feature of UV photodiodes is the radiation hardness and the semiconductor material, which can be either Silicon (Si), AlGaN or Silicon Carbide (SiC). Disadvantage of Si based photodiodes is the sensitivity to visible light. AlGaN and SiC based photodiodes are intrinsically visible blind. Moreover, AlGaN offers the opportunity to tune the absorption edge by varying the Al content thus enabling specialized UVA, UVB or UVC diodes without using filters. The present report informs about the degradation behavior of SiC and AlGaN photodiodes after 90 hours of illumination with 60 mW/cm².

EXPERIMENTAL PROCEDURE

A SiC broadband photodiode and two different types AlGaN photodiodes with absorption edge at 370 nm (GUVA) resp. 315 nm (GUVB) were placed in a UV aging chamber (all objects packaged in a TO18 housing). The short-circuited objects were illuminated for 90 hours with Hg medium pressure tubes resulting an irradiation at probe surface of 60 mW/cm².

RESULTS

To determine the effect of UV radiation the spectral response (SR) of the photodiodes was measured before (solid lines) and after 90 h (dashed lines) of UV aging. The SiC photodiodes (blue lines) show no measurable degradation. The AlGaN photodiodes (red, black, yellow and green lines) show a degradation between 80 % and 85 %.

