VALIDATION OF ATOMIC OXYGEN ACTIVE DETECTOR RESISTACK

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ABSTRACT

This paper reports on the validation of the active atomic oxygen (AO) sensor RESISTACK. Prototypes made of 5 metallized kapton layers 25µm thick have been tested at MSU (Montana, USA). The response to AO beam validates the original concept of this active detector.

The RESISTACK sensor consists in a stacking of metallized (Ag) polymer (Kapton) films acting a set of resistances in parallel: the total resistance gradually increases step by step each time a layer is fully eroded (opens “switch”); the number and thickness of layers define the range of fluence that can be monitored and the accuracy of detection.

The testing at MSU shows good response of devices to AO exposure. Figure 2(left) presents the evolution of resistance with time of exposure. It confirms that detection is sharp (the high AO reactivity of Ag thin deposit makes erosion time negligible compared to that of substrate) and provides accurate detection.

However, some (limited) dispersion is observed between 2 events (Figure 2(right)) due to 1) remaining mechanical stress that contributes to the rupture of the layer just before full erosion, 2) as Kapton foils here are used for PCB manufacturing, the presence of surface treatment for adhesion to copper introduces an offset.

First results of AO testing of RESISTACK provide good results and validate the concept of this AO active detector. Improvements are planned (12.5µm Kapton AC, removal of mechanical stress) that will be disclosed in final paper.