

Abstract Submitted
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Contemporary Issues in Ultra-Low Alpha Particle Counting

MICHAEL GORDON, IBM TJ Watson Research Center — Single-Event Upsets (SEU) in CMOS devices are caused by the passage of ionizing radiation either from terrestrial neutrons or from the natural alpha particle radiation within the materials surrounding the transistors. Interactions of the neutrons with the silicon cause spallation reactions which emit energetic highly ionizing elements. Alpha particles, on the other hand, can upset the devices through direct ionization rather than through a nuclear reaction as in the case of the neutrons. In order to minimize the alpha-particle component of SEU, the radiation from the materials within a distance 100 μm of the transistors, currently needs to have an alpha particle emissivity of less than 2 alpha particles per khr per square centimeter. Many alpha particle detectors have background levels that are larger than this, which can make these measurements inaccurate and time consuming. This talk will discuss what is involved in making alpha particle emissivity measurements of materials used in the semiconductor industry using an ultra-low background commercially-available ionization detector. Detector calibration and efficiency, radon adsorption on the samples, and the effect of surface charge on electrically insulating samples will be discussed.

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