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Alpha-particle emissivity screening of materials used for semiconductor manufacturing MICHAEL GORDON, KENNETH RODBELL, IBM TJ Watson Research Center — Single-Event Upsets (SEU's) in semiconductor memory and logic devices continue to be a reliability issue in modern CMOS devices. SEU's result from deposited charge in the Si devices caused by the passage of ionizing radiation. With technology scaling, the device area decreases, but the critical charge required to flip bits decreases as well. The interplay between both determines how the SEU rate scales with shrinking device geometries and dimensions. In order to minimize the alpha-particle component of SEU, the radiation in the device environment has to be at the Ultra-Low Alpha (ULA) activity levels, e.g. less than $2\alpha/\text{KHR}\cdot\text{cm}^2$. Most detectors have background levels that are significantly larger than that level which makes making these measurements difficult and time consuming. A new class of alpha particle detector, utilizing pulse shape discrimination, is now available which allows one to make measurements quickly with ultra-low detector background. This talk will discuss what is involved in making alpha particle measurements of materials in the ULA activity levels, in terms of calibration, radon adsorption mitigation, the time required for obtaining reasonable statistics and comparisons to other detectors.

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