Title

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GRAIN ORIENTATION AND STRAIN MEASUREMENTS IN MICRON WIDE PASSIVATED INDIVIDUAL Al AND Cu TEST STRUCTURES.

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At the Advanced Light Source Berkeley we have, over the last few years developed equipment and systems for measuring orientation and strain of individual grains within passivated thin film interconnects with a spatial resolution at the micron and sub micron level. A white x-ray beam of typical dimensions of 1 micron in size is generated when synchrotron radiation is focused using elliptically bent Kirk Patrick-Baez mirrors in a grazing incidence geometry. With white beam, Laue patterns of individual grains of Cu or Al can be recorded in ~ 1 sec. For monochromatic light a four-bounce crystal monochromator can be inserted into the beam without disturbing the original beam position on the sample. Strain measurements are made by determining the energy of the diffracted beam with high accuracy. Using a silicon single crystal standard for calibration our goal is to achieve lattice parameter measurements with a precision of 10 ppm. The experiments can be carried out at elevated temperatures and under the stress of an electrical current. Strain gradient measurements made with these facilities in passivated Cu and Al lines under electromigration stress will be described.

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