

# **Synchrotron X-ray Induced Radiation Damage in Integrated Circuit Structures**

I.C. Noyan  
Department of Applied Physics and Applied Mathematics SEAS  
Columbia University

X-ray diffraction and tomography data from scanning X-ray microscopes at third generation synchrotron facilities are routinely used for integrated circuit characterization. The X-ray beam sizes used to investigate current devices in these microscopes are smaller than a few hundred nanometers in diameter. These micro/nanobeams have high photon fluxes. For monochromatic x-ray beams of relatively low energy about 15 keV, no sample heating is expected, and past studies have reported no radiation damage in Si or Ge monochromators. During local strain measurements in thin semiconductor layers using monochromatic X-rays, however, the significant structural degradation has been observed.

We discuss the possible reasons for such damage and conclude that it is due to the swelling of buried insulator layers within the structure.