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Elastic properties of high porosity low-k thin films measured by Brillouin light scattering S. BAILEY, R. SOORYAKUMAR, The Ohio State University, S. KING, G. XU, E. MAYS, C. EGE, J. BIELEFELD, Intel Corporation — The continued scale down of material components present increasing challenges to technology development in the semiconductor industry. In particular, with the introduction of more porous materials and air gaps to further reduce permittivity, one significant issue is that low-k dielectrics in interconnects have sufficient mechanical strength. Since nano-indentation methods are questionable at these ultra-small thicknesses there is a need for non-invasive methods to characterize the mechanical properties of such highly compact porous structures. In this talk results of Brillouin scattering to measure elastic constants of thin (< 200 nm) low-k SiOC:H films with porosities up to 35% will be presented. Discrete longitudinal and transverse acoustic standing modes and their transformation to propagating excitations are investigated. The resulting mode dispersions provide for the Poisson's ratio (ν) and Young's modulus (E) and confirm that, for highest porosity, the reduction in dielectric constant does not result in severe degradation in ν and E.

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