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Second-Harmonic Generation scanning microscopy of strain fields around Through-Silicon-Vias YUJIN CHO, FARBOD SHAFIEI, Univ of Texas, Austin, BERNARDO MENDOZA, Centro de Investigaciones en Optica, Leon, Mexico, TENGFEI JIANG, PAUL HO, MICHAEL DOWNER, Univ of Texas, Austin — Through-Silicon-Vias (TSVs) improve electrical performance of integrated circuits and reduce power consumption by interconnecting vertically stacked silicon layers. Cu has been commonly used for TSVs because of its good electrical and mechanical properties. However, mismatch in thermal expansion coefficient of Si and Cu induces strain fields on the surfaces, which can degrade the performance of nearby devices and crack the surfaces. In this work, using non-invasive Second Harmonic Generation (SHG) microscopy, we successfully characterized inhomogeneous distribution of the thermally induced strain fields. High strain gradients strengthen SHG intensity, since it breaks centrosymmetry in Si. In p-polarized incoming beam and s-polarized SHG configuration, we were able to see the strain effect directly, while in p-in/ p-out polarization, strain-induced SHG was coupled with background SHG from Si [1]. We will present SHG micrographs compared with Raman measurement and the theory of strain-induced SHG, as well as wavelength and power dependence of SHG. [1] Mendoza et al. 'Surface second harmonic generation induced by 3D strain fields', Phys. Status Solidi B. 1-8 (2015)

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