

## **Surface second harmonic generation induced by 3D strain fields**

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### **Abstract.**

We present a general phenomenological model for surface second-harmonic generation (SSHG) induced by strain fields with up to three spatial coordinates. As an example, we apply it to thermal-mismatch strain fields around cylindrical metallic through-silicon-vias (TSVs) embedded in an Si(001) surface, which are widely used as interconnects between vertically stacked silicon layers to achieve 3D integration. We find that analysis of the four different combinations of s or p incoming and outgoing polarizations enables reconstruction of the strain field. In particular, the sS combination yields tensorial components of the strain field that are different from zero; from this information, the pP, sP, and pS combinations complete the analysis of the strain field.