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**Effect of photoacoustic generation mechanisms on transient**  
**grating measurements of thin films on silicon**

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Laser induced transient gratings technique is widely used for non-contact measurements of surface acoustic waves (SAWs). One major application of such measurements is characterization of thin films used in microelectronics. A peculiar phenomenon has been observed in transient gratings measurements of thin films on a silicon substrate: if the film is transparent, there is a systematic discrepancy between the measured and expected SAW velocity values that cannot be accounted for by instrumental errors. However, as soon as the sample is coated by an opaque metal film, the discrepancy disappears. In this presentation, we will show that the origin of the effect is in the competition of thermal and electronic mechanisms of the optical generation of sound in silicon. We will also describe another effect of the same origin observed on very thin semi-transparent metal films: at a certain film thickness, the SAW signal vanishes as the thermal expansion of the film and the contraction of silicon caused by photoexcited carriers cancel each other.