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Optical imaging of oscillating nanowires DAN HESSMAN, MONICA LEXHOLM, KIMBERLY DICK, SARA GHATNEKAR-NILSSON, LARS SAMUELSON, Nanometer Structure Consortium, Lund University — Systematic investigations of the mechanical properties of semiconductor nanowires require new measurement techniques. In this paper, we present a stroboscopic imaging technique using an optical microscope, capable of tracking the bending and oscillation of a nanowire in space and time. Due to the ideal shape of the nanowires, their position within an image may be determined with a precision given by the signal-to-noise ratio rather than by the optical resolution. We demonstrate an accuracy below 1 nm, more than two orders of magnitude better than the diffraction limit. Temporal information is obtained stroboscopically using a pulsed LED as a light source. The time-resolution is given by the width of the light pulses which in our experiments is below 100 ns. The nanowires are electrostatically bent by applying a voltage between the nanowire and a nearby W-needle. By applying voltage pulses we induce damped oscillations and by applying a sinus voltage we drive the nanowire at varying frequency. In both cases we get resonance frequencies of a few MHz for nanowires about 100 nm in diameter and 5 μm long.

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