



Contribution ID: 79

Type: poster

Photoelasticity of Silicon and its temperature dependence

Tuesday, 24 May 2016 18:00 (0 minutes)

The photoelastic coefficients p_{11-p12} and p_{44} of silicon for light of a wavelength of 1550 nm was measured using a rotating quarter wave plate polarimeter. The results $p_{11-p12} = (-0.1139 \pm 0.0014)$ and $p_{44} = (-0.0501 \pm 0.0014)$ for room temperature agree well with previously published data for various wavelengths. Additional measurements for the temperature dependence of the p_{11-p12} coefficients were done using a similar setup combined with a cryostat allowing sample temperatures down to about 10 K. The measurements show a temperature dependence with a maximum deviation of about 10% relative to the room temperature value.

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Session Classification: Poster Session