Abstracts

Measurements of the Photo-Induced Complex Permittivity of Si, Ge, and Te at 9 GHz

L. Ding, I. Shih, T.J.F. Pavlasek and C.H. Champness. "Measurements of the Photo-Induced Complex Permittivity of Si, Ge, and Te at 9 GHz." 1984 Transactions on Microwave Theory and Techniques 32.2 (Feb. 1984 [T-MTT]): 151-157.

The photo-induced complex permittivity Delta epsilon /sub r/(=Delta epsilon'/sub r/--j Delta epsilon''/subr/)of single, crystal silicon, germanium, and tellurium samples was studied using a transmission microwave bridge method at frequencies of about 9 GHz. The measurements were made at temperatures in a range from 100 to 300 K over an optical wavelength range from about 0.6 to 1.4 μm for silicon, 0.8 to 2.0 μm for germanium, and 1.5 to 4.2 μm for tellurium. The incident monochromatic illumination was chopped at about 90 Hz. It was found that the spectral variation of Delta epsilon'/sub r/ was similar to that for Delta epsilon''/sub r/ over the wavelength ranges with the incident monochromatic light intensity in the order of 100 μw/cm². The spectral peaks (for Si and Ge samples) of both Delta epsilon'/sub r/ and Delta epsilon''/sub r/ were found to shift towards shorter wavelengths as the temperature was decreased. From the photo-induced complex permittivity results, the collision time of the free carriers was derived.

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