

Causality relations in analysis of diffuse reflectance spectra obtained by infrared quantum cascade laser

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ABSTRACT

We present the technique and experimental laboratory setup for measuring and analysis of diffuse reflectance spectra obtained by tunable infrared quantum cascade laser with an average power of 15 mW. Using causality relations for real and imaginary part of reflectivity we can calculate extinction coefficient. We use the damped harmonic oscillator model to calculate synthetic spectra and test Kramers – Kronig relations for spectra calculations. To improve the accuracy of calculated extinction spectra we apply extrapolation of experimental spectra and phase correction. Using experimental setup and numerical methods of spectra analysis we could identify the powder of 30 μg of Acetylsalicylic acid and 40 μg of L-Tyrosine.

Keywords: infrared spectroscopy, identification, quantum cascade laser, Kramers – Kronig relations, diffuse reflectance, remote sensing

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