

On the Quantitative Photoacoustic Spectroscopy for Thermally Thick Samples: Theory

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In this work we present an approximation on the heat diffusion model of the frequency domain photoacoustic signal. By combining the amplitude and phase an analytical expression for the optical absorption coefficient is obtained. Our result shows that the optical absorption coefficient is proportional to the PA amplitude times the sine of the phase, and the expression only involves one thermal parameter, the thermal heat capacity. The simulation made on this mathematical result gives information about the optical spectral ranges where photoacoustic spectroscopy can be useful to obtain the optical absorption coefficient.