# Optical properties of a simple model of soft biological tissue

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**ABSTRACT**: The study of tissue optics is relevant for developing innovative non-invasive diagnostic and therapeutic techniques, and optical phantoms that simulate light propagation processes through soft biological tissue are required to evaluate the performance and calibrate different medical imaging modalities. Liquid lipid based low-cost phantoms were prepared, with cow's milk as scattering material, Red India ink as the absorbing material and demineralized water as the matrix material since it provides a soft medium biologically compatible with the addition of organic molecules. Two experiments were carried out for characterization of this tissue model. First, collimated and diffuse transmittance and reflectance spectra were measured using phantoms with milk of different fat content. From the data, dependence between: total extinction coefficient, Kubelka Munk's ratio, absorption and scattering coefficients on the wavelength were estimated. Second, using collimated transmittance measurements the effect of the phantom components was observed. The absorption peak, increases as ink was added to phantoms; and when lipid concentration was varied, by fixed ink, the scattering growths. The extinction coefficient's dependence on the wavelength was determined, and fluorescence was observed. Results confirm the possibility of spectroscopic identification of milk kinds, as well as the feasibility of low-cost controllable phantom for preliminary biophotonic studies.

**Keywords**: spectroscopy, phantom, tissue optics.