

# BIOMIMIC™ OPTICAL PHANTOMS

Solid phantoms based on optical-grade quality polymers are the ideal medium for system calibration and applications development. INO has developed optical phantoms that simulate a wide variety of tissues in the VIS-NIR. Biomimic™ polyurethane-based phantoms offer long term stability and reproducible optical properties that are a cost effective alternative solution to liquid media. Titanium oxide (TiO<sub>2</sub>) is used as scattering agent ; the resulting reduced scattering coefficient ( $\mu_s'$ ) varies slightly over the spectrum (see Figure 1). Similarly, carbon black is used as a universal absorbing dye providing a mostly flat absorption coefficient ( $\mu_a$ ) as a function of wavelength (see Figure 2). Thus, every phantom fabricated has its own absorption and scattering characteristics.



When manufacturing an optical phantom, a set of  $\mu_a$  and  $\mu_s'$  are selected at a reference wavelength. Every phantom fabricated at INO has its own characterization sample that is stored for further referencing. Thus every Biomimic™ phantom is characterized using a state-of-the-art high accuracy time-resolved transmittance technique (Bouchard et al, 2010) providing characterization reports that specify the exact  $\mu_a$  and  $\mu_s'$  values at the design reference wavelength. Additional characterization can always be done at any wavelength between 450 and 850 nm. The physical properties of the Biomimic™ optical phantoms are presented in Table 1.

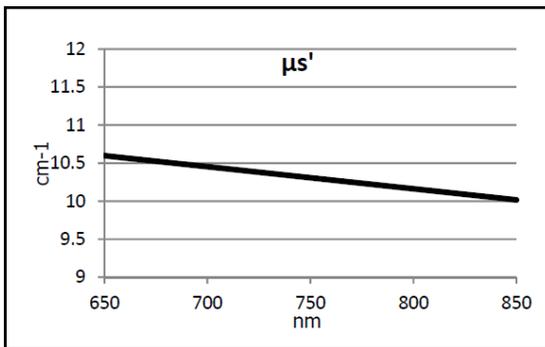


Figure 1. Variation of reduced scattering coefficient ( $\mu_s'$ ) over the NIR spectrum.

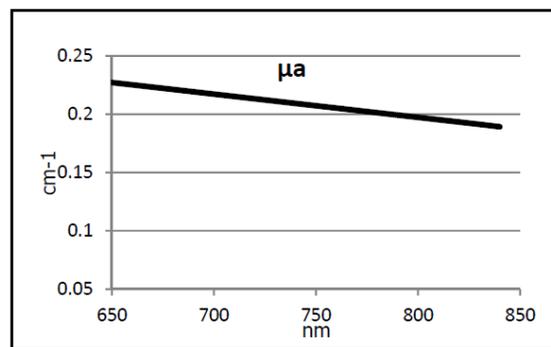


Figure 2. Variation of absorption coefficient ( $\mu_a$ ) over the NIR spectrum.

Table 1. Physical properties of the Biomimic™ optical phantoms

Physical property	Value
Shore Hardness	84 D
Refractive Index	1.521 ± 0.006
Anisotropy Factor	0.62 ± 0.015