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Quantifying optical properties of hemozoin for the rapid detection of malaria[1] KYLE BLASINSKY, AMANDA MCGREER, John Carroll University, ROBERT DEISSLER, Case Western Reserve University, DANIELLE KARA, John Carroll University — Hemozoin, a byproduct of plasmodium, is the basis of a new approach for efficient, cost-effective malaria detection. Clinical success of malaria detection with a magneto-optical device (MOD) motivates quantification of the optical interactions forming the basis for this detection mechanism. MOD is used to measure the intensity of polarized light transmitted through a sample of hemozoin suspended in phosphate-buffered saline, subject to a magnetic field ($\vec{B}$) that can be turned on and off. According to Beers law, ratios of transmitted light with $\vec{B}$ on and off as a function of hemozoin concentration are related to change in cross-sectional absorption $\Delta\sigma = \sigma_B$ on $- \sigma_B$ off. We tested several hemozoin concentrations, linearly fit intensity ratio versus concentration data, and accounted for thermal effects using a basis transformation to find $\sigma_\parallel - \sigma_\perp = 1.56 \pm 0.43\text{cm}^3$ where $\sigma_\parallel$ ($\sigma_\perp$) corresponds to polarization parallel (perpendicular) to $\vec{B}$. This result is comparable to other published work, and the quantification of $\sigma_\parallel - \sigma_\perp$ informs our understanding of the magneto-optical properties of hemozoin, which advances malaria detection.

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