

Abstract Submitted  
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**Coupling between absorption and scattering in disordered colloids**<sup>1</sup> ANNA STEPHENSON, VICTORIA HWANG, JIN-GYU PARK, VINOTHAN N. MANOHARAN, Harvard University — We aim to understand how scattering and absorption are coupled in disordered colloidal suspensions containing absorbing molecules (dyes). When the absorption length is shorter than the transport length, absorption dominates, and absorption and scattering can be seen as two additive effects. However, when the transport length is shorter than the absorption length, the scattering and absorption become coupled, as multiple scattering increases the path length of the light in the sample, leading to a higher probability of absorption. To quantify this synergistic effect, we measure the diffuse reflectance spectra of colloidal samples of varying dye concentrations, thicknesses, and particle concentrations, and we calculate the transport length and absorption length from our measurements, using a radiative transfer model. At particle concentrations so high that the particles form disordered packings, we find a minimum in the transport length. We show that selecting a dye where the absorption peak matches the location of the minimum in the transport length allows for enhanced absorption.

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