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Light transport in dense composite media: role of near-field coupling ROXANA REZVANI NARAGHI, CREOL and Department of Physics,University of Central Florida , SERGEY SUKHOV, CREOL, University of Central Florida , JUAN JOS SENZ, Condensed Matter Physics Center, Universidad Autnoma de Madrid and Donostia International Physics Center, Paseo Manuel Lardizabal 4, ARISTIDE DOGARIU, CREOL,University of Central Florida — In scattering media, optical waves comprise both homogeneous and evanescent components. At very high concentrations of scatterers, particles are located in close proximity and interact through evanescent near fields. Thus, in this regime the energy is not only carried by propagating waves but it also evolves through evanescent coupling between individual scatterers. We have shown that in dense composite media additional transmission channels open because of these near-field interactions between close proximity scatters and, consequently, a new regime of transport emerges. This is clearly beyond simple descriptions of scatterers acting independently of their environment and framed in terms of far-field characteristics such as Mie cross-sections. We will show that, because in the dense media the energy can transfer through both diffusion and evanescent channels, the total transmittance is $T = T_{CS} + T_{NF} = 1/L(l^*_{CS} + l^*_{NF})$. Correcting the total transmission in this manner is appealing because it is done in terms of physically meaningful and measurable quantities such a near-field (NF) scattering cross-section σ_{NF}.

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