

Abstract Submitted
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Light propagation in random colloidal films with varying coordination number XIAOTAO PENG, ANTHONY DINSMORE, University of Massachusetts, Amherst — We measure the propagation of light through a random film of strongly-scattering microspheres as a function of the number of contacts per particle (the coordination number, Z). Decreasing Z reduces the average refractive index, and enhances the optical contrast of each scattering sphere with the effective background. In our experiments, we mix two kinds of colloidal spheres and prepare a dried film with random structure. We then dissolve spheres of one kind to vary Z for the other kind. Polystyrene and poly(methylmethacrylate) spheres are used, as well as latex spheres coated with a high-index ZnS or SnS layer to enhance scattering. The transport mean-free path is then extracted from the angular distribution of backscattered light. The results may guide our understanding of the propagation of waves in random media in general and may lead to new photonic materials. This work is supported by the NSF-sponsored UMass MRSEC. A.D.D. is a Cottrell Scholar of the Research Corporation.

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