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Thermal insulator transition induced by interface scattering BRIAN SLOVICK, SRINI KRISHNAMURTHY, SRI International — The classic Bruggeman percolation model of thermal conductivity for composite materials is generalized to include the effects of interfacial scattering [1]. This generalized model accurately explains the measured variation of the composite thermal conductivity with loading and particle size. At high loadings, this model further predicts that strong interface scattering leads to a sharp decrease in thermal conductivity, or an insulator transition, when conduction through the matrix is restricted and heat is forced to diffuse through particles with large interface resistance. The closed form and accuracy of the model, and its ability to predict transitions between insulating and conducting states, suggest it can be a useful tool for designing composite materials with low or high thermal conductivity for a number of applications. [1] B. A. Slovick and S. Krishnamurthy, Appl. Phys. Lett. 109, 141905 (2016).

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