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Understanding Thermal Conductivity in Amorphous Materials
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Current energy technologies such as thermoelectrics, photovoltaics, and LEDs make extensive use of amorphous materials and are limited by heat transfer. Device improvements necessitate a better understanding of the thermal conductivity in amorphous materials. While there are basic theories that capture the trends in thermal conductivity of a select set of amorphous materials, a general framework is needed to explain the fundamental transport of heat in all amorphous materials. One empirical theory that has been successful at describing the thermal conductivity in some materials is the k-min model, however, assumptions in that model limit its generalizability. Another theory defines the existence of propagons, diffusons, and locons, which constitute vibrational modes that carry heat. Our work first presents a summary of literature on the thermal conductivity in amorphous materials and then compares those theories to a breadth of experimental data. Based upon those results, a generic model is proposed that is widely applicable with the ultimate goal of this work being to describe the temperature dependent thermal conductivity of polymers. -/abstract- Sampath Kommandur and Shannon K. Yee 21.1.1: Thermoelectric Phenomena, Materials, Devices, and Applications (GER

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