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Simulating the Effect of Flame Retardant Materials on Heat Diffusion in Polymers JOSEPH ORTIZ, Stony Brook University, ARPON RAKSIT, Commack High School, DILIP GERSAPPE, Stony Brook University — Many commonly used polymers have low ignition temperatures, presenting the dangers of combustion and thermal degradation. Simulating the effect of flame retardants on the spread of heat throughout a polymer may provide a better understanding on how to effectively manipulate and make use of flame retardant materials. Using the lattice Boltzmann method, a simulation of heat diffusion from a heat source to sink was implemented in three dimensions. The polymer and flame retardant material were incorporated into the system by implementing ignition within the particles of the polymer and by adding heat absorbing microscale filler particles within the polymer matrix, while allowing for reduced-rate heat transfer between interspecies particles. Flame retardant particles were given various volume fractions and morphologies in order to simulate the addition of a variety of particles such as carbon nanotubes. By manipulating the flame retardant particles' ability to absorb heat, and their efficiency in removing heat from the system, different degrees of polymer heat transport were simulated while polymer systems ranged from single polymer systems to multi-component blends.

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