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High thermal conductivity polymers MORTAZA SAEIDIJAVASH, Graduate Student at University Of Oklahoma, Department of Aerospace and Mechanical Engineering, JIVTESH GARG, University of Oklahoma — In this work we investigate the effect of mechanical stretching on polymer thermal conductivity. Polymer materials are used as electrical insulators, but their poor thermal conductivity also makes them thermal insulators making removal of heat generated in such electronic systems challenging. Enhancement of polymer thermal conductivity can allow for better thermal management including design of low cost heat sinks and compliant thermal interface materials. Stretching is known to induce alignment of molecular chains in a polymer system increasing thermal conductivity. In this work we explore this idea by mechanically stretching ultra-high molecular weight (UHMW) polyethylene bars using a tensile load cell. The in-plane thermal conductivity of stretched polymer is measured using laser-flash method. We have measured thermal conductivity enhancement of almost 100% for stretch ratios of 6 to 10. These result are consistent with previous studies of thermal conductivity enhancement through such stretching. Ways to chemically achieve this molecular alignment are being explored using techniques of spin coating and electrospinning.

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