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Investigation of anisotropic thermal transport in polymers using infrared thermography DAVID NIETO SIMAVILLA, DAVID VENERUS, JAY SCHIEBER, Illinois Institute of Technology — During manufacturing, the anisotropic nature of thermal transport in flowing polymers plays an important role in the final properties of materials. In our laboratory, we have investigated anisotropic thermal conductivity in polymers subjected to deformation using an optical technique based on Forced Rayleigh Scattering (FRS). For over a decade, our setup has been the only one capable of testing the linear relationship between anisotropy in thermal conductivity and stress, known as the stress-thermal rule. In order to overcome some of the limitations in the optical properties of materials inherent to FRS, we have recently developed a complementary technique based on infrared thermography (IRT). We validate IRT technique by comparing measurements of anisotropy in thermal conductivity on crosslinked networks against those obtained with FRS. The main advantage of IRT method is that, it allows us to study optically thick materials, including polymers that are prone to strain induced crystallization. Additionally, examination of IRT transient state experiments enables us to study the effect of deformation on other properties such as specific heat capacity.

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