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Transient Conductivity of Kapton HN JUSTIN DEKANY, J.R. DENNISON, STEVE HART, Utah State University — The transient conductivity of the polymer Kapton HN has been determined by applying a constant voltage across the material and measuring the resulting current decay, collected over more than four orders of magnitude in time, using a custom vacuum system with a stable low-level electrometer. The model, used to describe conductivity as the material reaches a stable state, includes two distinct components. First, there is a polarization, with exponential time dependence, that results from the realignment of the molecular dipoles in the material that orient parallel to the applied electric field. The second component of the transient current flow, diffusive conductivity, with power law time dependence, results from a diffusion of charge injected into the material from the voltage plate. The model allows for more than one mechanism—and a corresponding decay term—for both polarization and diffusive conductivity. Results of the analysis are interpreted in terms of the polymer's complex molecular structure, blend of amorphous and nanocrystalline structure, and the nature of localized states used to determine the carrier density in insulating polymers.

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