

Abstract Submitted
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Dynamics of Precise Ethylene-Acrylic Acid Copolymers and Ionomers Using Dielectric Spectroscopy¹ JAMES RUNT, U HYEOK CHOI, HANQING MASSER, Penn State University, C. FRANCISCO BUITRAGO, L. ROBERT MIDDLETON, KAREN WINEY, University of Pennsylvania, JOSEPH CORDARO, AMALIE FRISCHKNECHT, Sandia National Laboratories — This investigation focuses on a molecular-level understanding of the dynamics of novel copolymers, consisting of monodisperse ethylene sequences between very precisely spaced acrylic acid or ionic functionality. Incorporating ions in precise acid copolymers (via neutralization of a portion of the acid functionality) results in significant changes in the association state of the acid and ionic groups, as well as polymer and ion dynamics. The dynamics of these materials were explored over a wide temperature and frequency range using dielectric spectroscopy. Acid copolymers exhibit two local relaxations in the glassy state and a segmental relaxation above T_g . In addition, two slower relaxations above T_g were observed in ionomers, and their origin will be discussed in the presentation. For example, the highest temperature process is assigned to Maxwell-Wagner-Sillars (MWS) interfacial polarization, associated with the microphase separated structure. A transition in the MWS relaxation frequency and strength is observed around the melting point of copolymers with sufficiently long ethylene sequences, suggesting that the MWS process in these materials is strongly correlated with crystallinity of the ethylene backbone.

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