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Semicrystalline Ionomer-Metal Carboxylate Composite: Phase Behavior and Mechanical Properties KATSUYUKI WAKABAYASHI, RICHARD A. REGISTER, Department of Chemical Engineering, Princeton University, Princeton NJ 08544-5263 — We have shown previously that the thermal and mechanical behavior of ethylene-methacrylic acid (E-MAA) ionomers can be tuned by the addition of certain magnesium carboxylates, such as magnesium stearate (MgSt). The property modifications result from coassembly of the two components, both co-aggregation of the ionic groups and co-crystallization of the methylene sequences, as revealed by X-ray scattering. When MgSt is replaced by sodium stearate (NaSt), a different suite of mechanical properties is obtained. NaSt, with its high melting and clearing (288 °C) points, readily crystallizes out of solution in the molten polymer and forms an effective composite upon cooling from a single-phase melt. The NaSt crystals in the composite resemble the rectangular polymorph in pure NaSt, though with some differences in lattice parameters and transition temperatures due to interaction with the acid groups of the copolymer. The different physical properties of the NaSt *vs*. MgSt modified ionomers are traced to these microstructural differences, elucidated through a combination of X-ray scattering and microscopy.

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