PORT PLASTICS

Semiconductor

WHAT EXACTLY IS A SEMICRYSTALLINE POLYMER?

We have already discussed the differences between and relevance of amorphous polymers and crystalline polymers as they relate to their role in the semiconductor industry. Amorphous polymers are generally characterized as a loose, almost spaghetti-like structure. This structure delivers higher impact, and they tend to soften at elevated temperatures rather than melting. Crystalline polymers are tight lattice structures, known for chemical resistance and having a definitive melting point.

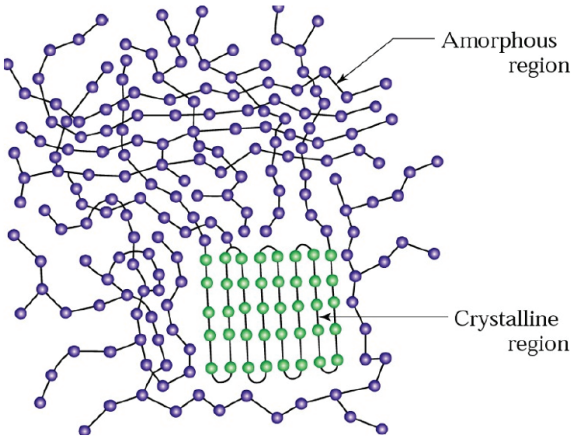
But what about materials classified as semicrystalline? What makes these materials unique in terms of properties desirable to semiconductor applications? Semicrystalline polymers are composite materials on a nano scale! Essentially, they are made up of lamellar crystals separated by amorphous phases. Lamellar structures are tightly packed folded polymer loops such as in the green in the below picture. The degree of crystallization defines the ratio of the lamellar phase to the amorphous phase, and defines the properties of the polymer. As composites are known for their outstanding mechanical properties, many semicrystalline materials offer higher mechanical properties and ductility as well as excellent chemical resistance. The chemical resistance comes from the crystalline phase while the ductility comes from the amorphous phase.

So what are some common semicrystalline materials used in Semiconductor Process tools?

PEEK – is a perfect example of how a blend of crystalline & amorphous phases can result in extraordinary properties. Delivering a high weight-to-strength, elevated thermal performance, excellent chemical resistance, and inherent FM-4910 compliance, PEEK is perfect for Wet Process applications.

PET – PET is manufactured to control the level of crystallization and thus aspects of the finished properties. Machinable grade PET, characterized by its opaque color, has a higher degree of crystallization, so it delivers excellent mechanical and chemical properties.

Other semicrystalline polymers used extensively in Semiconductor manufacturing are **PPS, Acetal & UHMW-PE. SEMIcrystalline polymers are at the heart of SEMIconductor plastics!**



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