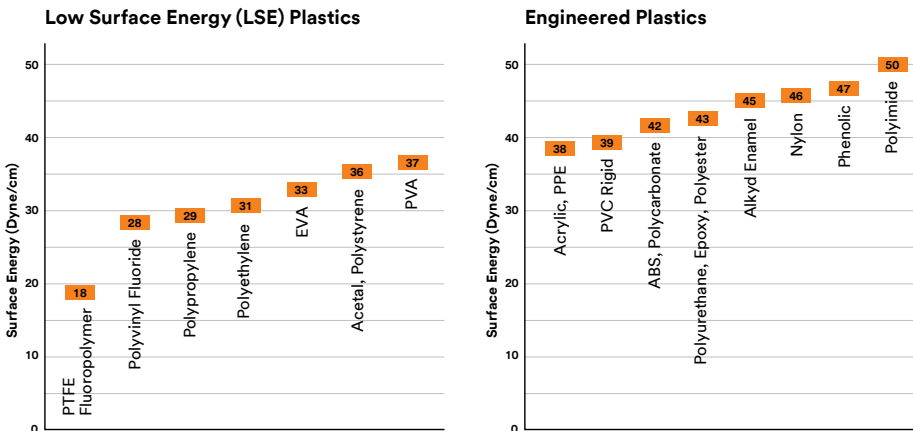


Energized by Surface Energy

To form an adhesive bond, the adhesive must make intimate contact with the surface of each substrate. Therefore, the adhesive must be selected with an understanding of the surface energy and cleanliness of the substrates.

Surface energy is a physical property of the surface of a material that determines whether an adhesive will make intimate contact. On a material with high surface energy, a liquid will spread out or wet the surface; on a material with low surface energy, the liquid will resist flowing and bead up. Imagine pouring water onto a steel pan and a nonstick pan at the same time. On clean steel, the water will spread out into a thin film on the surface. On the nonstick pan, the water will form multiple “beads”. This mimics how adhesive will act on high surface energy (metals) and low surface energy (many plastics) substrates. An adhesive must wet out the substrate to provide a robust bond.



To choose the proper adhesive it's important to understand the surface energies of all the substrates and how well the adhesive will wet out each one. Surface cleanliness is also a factor in how well an adhesive can bond to the substrate: if the surface is covered by dirt, oils, mold release agents, etc., it will be more difficult for the tape to make contact with the substrate. If it is challenging to adhere to a material due to its low surface energy, it is critical to choose the correct adhesive to bond that material.

If the required adhesive cannot adhere to the substrate inherently, there are various ways to increase the surface energy of a material, improving the ability to bond.

Here are a few different ways to modify surface energy:

Priming—The ability of a liquid to chemically interact at the surface can be improved with primers or adhesion promoters. Primers work by adding a monolayer or thin coating of a functional material to the surface. Primers are chemically designed so that one end of the molecules bond very well to low-surface-energy materials while the free end bonds very well to adhesives.

Plasma Treatment—Plasma treatments expose the surface of a material to an ionized gas which changes the chemical reactivity of the surface atoms. There are several different varieties of plasma treating, and there many different companies specializing in plasma-treatment services.

Flame Treatment—Flame treatment takes advantage of the combustion chemistry of a “flame” to chemically alter the surface atoms of a substrate. As with plasma treatments, there are a variety of companies specializing in flame treatment for different materials.



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