Reduced surface adhesion by Gas Plasma

Surface energy is a property of a material that determines such factors as wettability, printability, chemical resistance and bio-fouling. In general, materials with high surface energies are hydrophilic and wettable to inks, adhesives and various other adsorbates and coatings. Low energy surfaces, on the other hand, are termed hydrophobic and are characteristically "non-stick". The concept of "non-stick" surfaces is well known for kitchen wear products. Coatings such as Teflon are applied to cooking pots to prevent food adhering to cooking surfaces. Non-stick applications, however, extend well beyond frying pans. In-vivo and in-vitro medical devices may require surfaces to resist the adherence of proteins or cells. Drug dispensation devices require metering chambers that will not allow the drug to adhere to its inner walls. Reusable containers that carry bio-waste need to be easily emptied and washed. These are just some examples where surfaces need to be engineered to improve their "non-stick" properties.

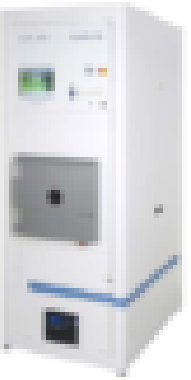
Reducing surface energy

A surfaces affinity for adsorbtion is reduced by lowering its surface free energy. That is, the energy the surface has available to it for the formation of chemical bonds. One way of doing this is to apply a thin coating that has an inherently low surface energy. Polymeric fluorocarbon coatings exhibit "teflon-like" properties and are made from the same $(CF_2)_n$ chemical units as Teflon. These coatings readily adhere to a wide range of materials when deposited on the surface using a technique called plasma enhanced chemical vapor deposition (PECVD). Gas plasma processing provides a reliable, consistent, and environmentally friendly method of reducing the surface energy of materials by polymerizing fluorocarbons onto a surface in a highly controlled environment.

What is plasma?

Plasma is a state of matter just as a solid, liquid or gas. Add enough energy to a gas and it becomes ionized into the plasma state. Chemically it is a highly reactive environment that is used to change the properties of surfaces without affecting the bulk material.

PECVD works by activating species, such as monomers, in the plasma and inducing their polymerization on the substrate workpiece. Surface properties of the deposited coating are determined within the first few tens of nanometers of the surface.



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