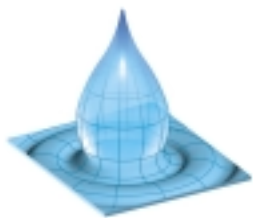


HydroLAST™

H Y D R O P H I L I C S U R F A C E T R E A T M E N T



BioLAST™ Technology

AST Products' platform technology, known as BioLAST, is a water based coating technology. BioLAST contains two major components: biocompatible polymers covalently bound to substrate materials and bioactive ingredients that impart valuable characteristics to a surface. BioLAST coatings can make a surface antimicrobial, lubricious, hydrophilic, anti-thrombogenic, or anti-encrustive and can incorporate drugs for controlled release. Able to be applied to virtually any biomaterial, BioLAST coatings have been used in a variety of medical devices that have been approved by the FDA and are in use worldwide.

HydroLAST™ coatings are

Hydrophilic:

HydroLAST coatings improve the wettability and wicking of most polymeric biomaterials.

Stable:

HydroLAST remains effective at pH levels ranging from 2 to 13 for at least 1 year in ambient storage environments.

Thin:

HydroLAST coatings are sub-micron in thickness. They do not alter mechanical or optical properties.

Biocompatible:

HydroLAST is non-toxic as concluded through test methods based on USP XXII.

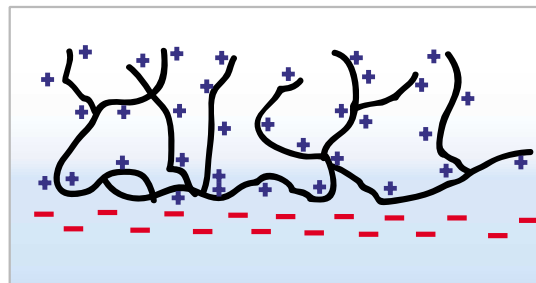
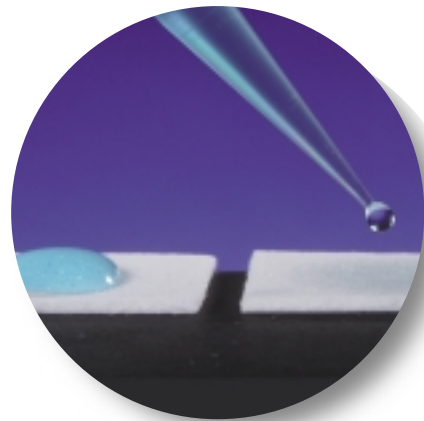
Accepted:

Covered by U.S. patents 5,700,559, 5,807,636, and 5,837,377, HydroLAST is accepted for use in surgical devices, wicking components of diagnostics, battery separators, and microplates.

Reactive:

HydroLAST coatings contain abundant hydrophilic functional groups that can include hydroxyl, carboxyl, or amine functionalities. These reactive sites can be further derivatized for protein or ligand immobilization.

How does HydroLAST™ work?



+ = Charged or Functional Groups - = Counterions

HydroLAST is a process by which hydrophilic polymers are grafted permanently to the surface of a hydrophobic substrate. The hydrophilic polymer has carboxyl, hydroxyl, or amine functionalities that serve to loosely bind water. Once treated, the substrate "wets out" and allows water and reagents to flow easily over or through it (in the case of porous substrates). Unlike conventional hydrophilic treatments such as straight plasma, corona, or ozone processing, the surface is permanently rather than transiently hydrophilic. Greater assay accuracies can be achieved, higher throughputs can be realized, and diagnostic process automation can be accomplished.

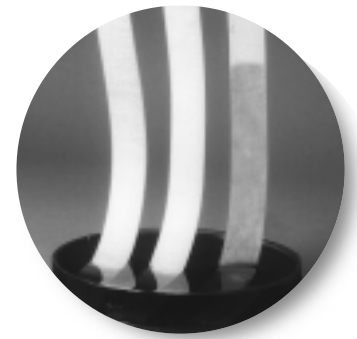


Partnership Approach

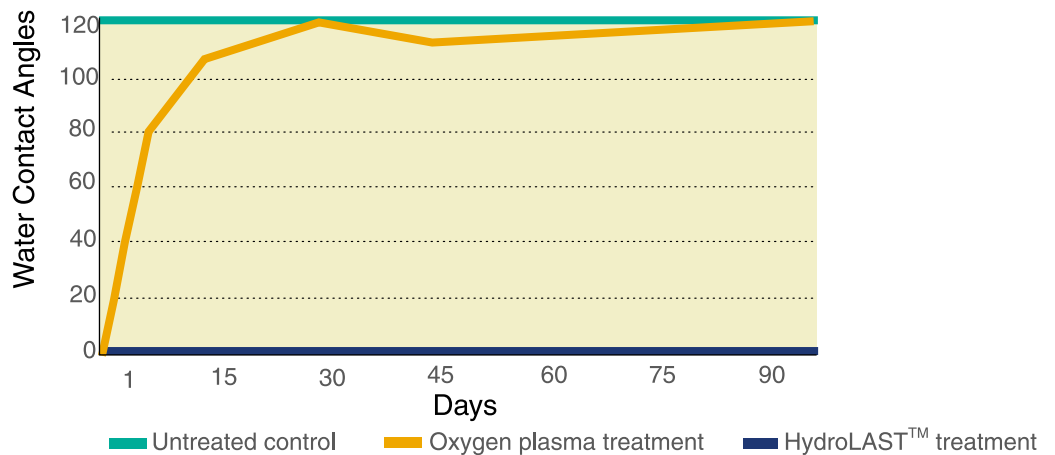
AST partners with its customers from beginning to end. Our customers have complete access to AST's considerable technical expertise throughout the device design and development process. By working with customers every step of the way, small design changes can be made early in the process that prevent huge delays and overruns late in the game. Along with the coating chemistries, a customized, easy-to-use process is developed under strict ISO design control. Our partnership support does not end with the finalization of coating formulation or product design. We work with the customers to ensure smooth and trouble-free implementation at their or at AST's facilities. To accelerate the approval of new devices, AST's experienced staff continues to provide assistance throughout the regulatory approval process and product introduction.

Enhanced Hydrophilic Properties

The photograph on the right illustrates the enhanced hydrophilicity imparted to ultra-high molecular weight polyethylene (UHMWPE) by HydroLAST. The untreated control does not wick any water. The oxygen treated sample shows some wicking, while the HydroLAST sample readily wicks water. In many cases, the water contact angle is reduced to zero after processing. This property is important in many diagnostic and medical device applications. Enhanced hydrophilicity is important in industrial applications where restriction of fluid flow creates problems. Examples include battery separators and printing applications.



Stability



The graph on the top illustrates the stability of HydroLAST. After 90 days of repeated sonication, the water contact angle of treated ultra-high molecular weight polyethylene (UHMWPE) remains at zero. Within a few days, oxygen plasma treated UHMWPE has become essentially hydrophobic with a water contact angle of more than 70°. Shortly thereafter, the contact angle approaches that of the control, namely, a very hydrophobic 120°. At pH levels ranging from 2 to 13 and at elevated temperatures, HydroLAST exhibited far superior stability as compared to that of conventional plasma or corona surface treatments.

Biocompatibility and Sterilizability

HydroLAST treated parts can be sterilized by gamma and e-beam sterilization. It is non-toxic and has passed cytotoxicity, direct hemolysis, systemic toxicity, all other biocompatibility tests associated with blood contact devices.