

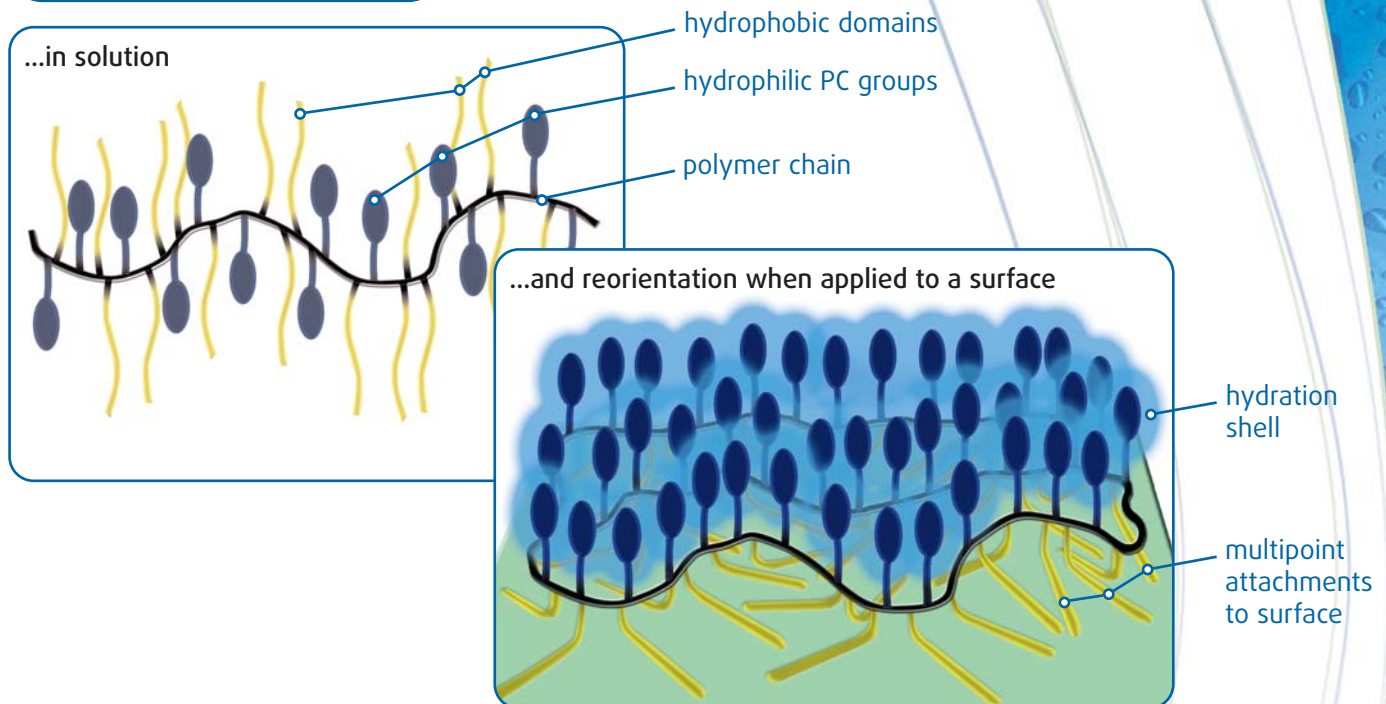
What is PC and PC TECHNOLOGY™?



PC is short for phosphorylcholine, the chemical name of a polar head group found in many phospholipids, particularly those that form the bi-layers that make up cell membranes. As the predominant head group present in the lipids of the outer membrane layer, PC plays a key role in determining how a cell interacts with its surrounding environment and is attributed to be one of the primary natural materials responsible for the biocompatibility that exists between most cells.

PC is zwitterionic i.e. has a positive and negative charge on the same molecule but is overall electrochemically neutral. This confers the PC group with high polarity and consequently a natural affinity for water. As a result, materials that incorporate the PC group are surrounded by molecular layers of water that effectively mask the substrate to which it is applied, providing a biological “non-stick” surface that resists protein and cell adhesion.

Diagrams of PC Polymer...



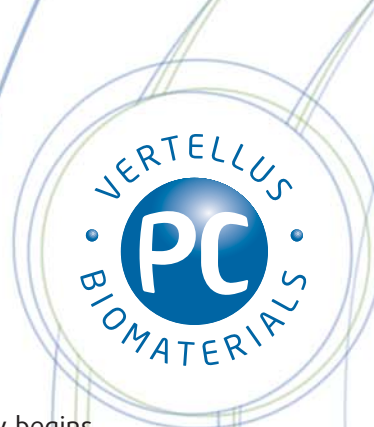
PC Technology is a proprietary platform of methacrylate polymers incorporating phosphorylcholine. These biomimetic materials build upon the body’s own chemistry but are totally synthetic, allowing precise control over the purity profile, the molecular structure and avoiding any of the risks associated with animal derived materials. They can provide an elegant solution to biocompatibility challenges for medical devices and can be tailored to specific application needs. For example, PC materials are available as coatings, bulk materials, gels and solutions and properties such as water content, elasticity and hardness can easily be varied. Several of these systems have been successfully used to enable the localised delivery of drugs and, once again, variation of the polymer allows the release rate of the active to be varied considerably.

For clinically proven biocompatibility

Contact us at: info@pcbiomaterials.com
More information at: www.pcbiomaterials.com

PC TECHNOLOGY™

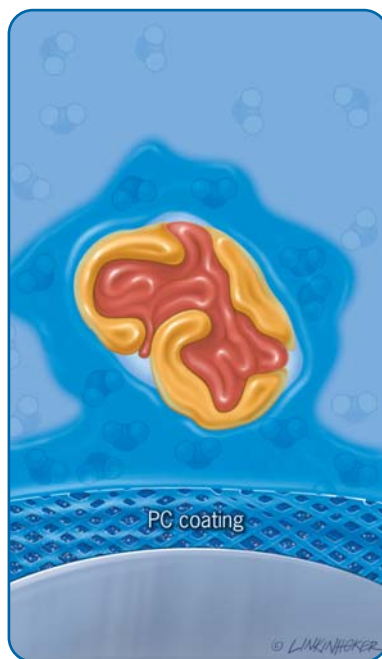
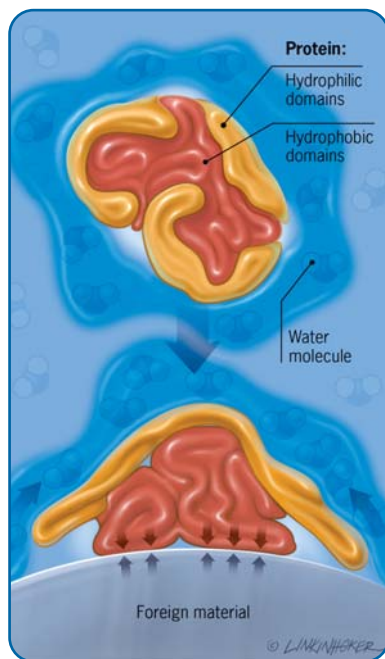
Mode of Action



Invariably when a foreign material is placed in the body, it immediately begins to “reject” the material through the deposition of lipids and proteins, which denature, adopting active conformations and encouraging the adhesion of cells from the surrounding environment. These cells may then promote further fouling of the surface. For instance, when blood contacts a foreign material, the clotting cascade is initiated. Plasma proteins become irreversibly bound to the surface, and this is followed by platelet adhesion and activation, leading to the release of additional activating factors and eventually the formation of blood clots, or thrombi. By inhibiting the initial adsorption of proteins, PC materials provide an inert, non-thrombogenic surface. Suppression of protein fouling can also lead to significant reductions in the adhesion of bacterial cells and to reduced giant cell adhesion and activation.

- PC is surrounded by tightly held layers of water that form an effective barrier, providing a ‘non-stick’ surface that resists protein and cell adhesion

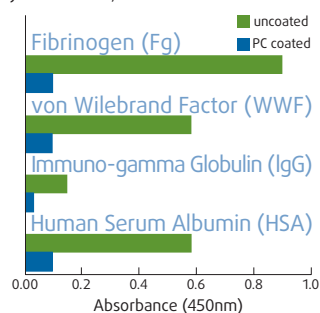
Schematic diagram indicating how a protein interacts with a foreign body



On the left it is shown how, after a ‘passive’ interaction with the surface, the protein may lose its own shell of hydration, denature and irreversibly bind to the surface. In vivo, these conformational changes, exposing binding sites for interaction with other proteins and cells, lead to a ‘foreign body’ response which can result in the formation of blood clots, a fibrous capsule or an excessive inflammatory response. In the case of a PC coated substrate (right), the protein can still interact with the surface but it is now energetically unfavourable for irreversible binding to occur. Essentially the surface layer of water bound to the PC disguises the surface such that the protein does not recognise the foreign body and therefore does not denature and activate.

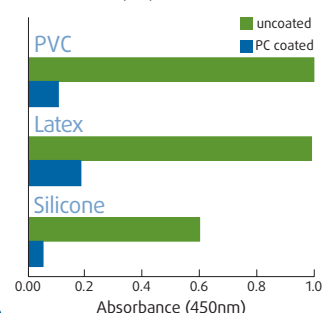
Protein Adhesion In Vitro

J Chem Edu 79, 321 2002



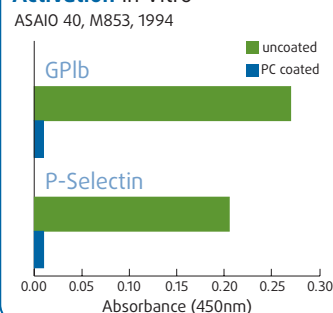
Bacterial Adhesion In Vitro

Biomaterials 22, 99, 2001



Platelet Adhesion and Activation In Vitro

ASAIO 40, M853, 1994



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