CASE STUDY

Surface activation and cleaning

Activation of Surfaces for Biomedical Applications

ACTIVATION OF SURFACES FOR BIOMEDICAL APPLICATIONS

Bio-interfaces, the interfaces between proteins, cells or tissues and inert materials, are fascinating systems that play key roles in biological and biomedical applications. Research in our laboratory focuses on the design of novel biomaterials and methodologies that allow the study of bio-interfaces and their control for applications in cell-based assays, bio-sensors and regenerative medicine.

Our work in the field of biomaterials design is inspired by Nature's strategies to generate complexity and control function and properties. In particular, we are interested in novel synthetic tools and methodologies allowing the use of Nature's own building blocks, peptide sequences, to confer mechanical, chemical and biological properties to biomaterials. This approach, well suited for design, is appealing as it makes use of the inherent biological "wiring" that has evolved to control cell and tissue homeostasis: peptide sequences and proteins are the key components that shape biological tissues. In addition, we develop new micro- and nano-patterning techniques to recreate the geometric and hierarchical complexity encountered in cells and tissues (e.g. positioning of organelles, generation of cell polarity and mimicking of tissue architecture and morphogenesis).

ABOUT THE CUSTOMER

Biomaterials are any material, surface or matter that forms a boundary to, and interacts with a biological system and as such they are frequently developed, used and adapted for novel medical applications.

Our plasma treatment systems play a key enabling role in this exciting field of research, as discussed below by Dr. Julien Gautrot.

Queen Mary University of London

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OUR SOLUTION

Low pressure plasma treatment is a key enabling step for cleaning, preparation, and modification of biomaterial surfaces. The plasma can be used to remove absorbed contaminants and other impurities, producing cleaner and more well-controlled surfaces thanwithotherpreparationmethods.Plasmas also activate the top most surface layers, rendering the material hydrophilic, which in turn promotes attachment and adhesion of functional biological species. In essence, plasma treatment can enhance functionality and biocompatibility of biomaterial surfaces.

We chose the compact benchtop plasma system from Henniker following a recommendation from a colleague. The technical staff at Henniker were very knowledgeable and understood what we needed from a plasma unit. Communication was great and they dealt with our enquiry efficiently from the start.

Key questions that these tools will help us to address are: how do biological, mechanical and chemical properties of bio-materials (whether synthetic or of natural origin) cross- talk to control cell behaviour and in particular stem cell fate decision? How do cells remodel such materials and how does this impact on cell behaviour and tissue formation? Finally, what is the minimum set of rules or properties required to achieve a desired cell or tissue function?

“We needed a low throughput relatively small chamber at a reasonable cost. Your equipment was just right for our type of applications and sample sizes”

“The technical staff at Henniker were very knowledgeable and understood what we needed from a plasma unit”

Julien Gautrot
Lecturer in Biomaterials at QMUL