

Christmas Lecture

December 16, 2010

12.00 h

CIC bioGUNE

ATRIO 800

Invited Speaker:

Ralf Richter, PhD

TITLE:

Biomolecular hydrogels – from supramolecular organization to biological function

or

How to nail jelly to a wall?

Nature has evolved complex materials that are exquisitely designed to perform specific functions. Certain proteins and glycans self-organize in vivo into soft and dynamic, strongly hydrated gel-like matrices. Illustrative examples of such biomolecular hydrogels are cartilage, mucous membranes, and the slimy coats around bacteria in biofilms. Even though biomolecular hydrogels are ubiquitous in living organisms and fulfill fundamental biological tasks, we have today a very limited understanding of their internal organization, and how they function. The main reason is that this type of assemblies is difficult to study with conventional biochemical methods.

In order to study biomolecular hydrogels directly on the supramolecular level, we have developed an unconventional approach that draws on knowledge from several scientific disciplines. Exploiting surface science tools, we tailor-make model systems by directed self-assembly of purified components on solid supports. With a toolbox of biophysical characterization techniques, these model systems can be investigated quantitatively and in great detail. The experimental data, combined with polymer theory, allow us to develop a better understanding of the relationship between the supramolecular organization and dynamics of biomolecular hydrogels, their physico-chemical properties and their biological function. To illustrate this concept, I will present a few examples, including our recent work on the “sweet” jelly-like matrix that forms around the mammalian egg during ovulation and that is crucial for fertility.