



**Biointerphases**

# Biointerphases®

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## JULY 2009 MEDIA HIGHLIGHT

### **Artificial membranes get charged**

As early as the seventeenth century, scientists realized that some sort of a fatty membrane, made up of molecules known as lipids, must surround cells to keep their contents from spilling over. It took two more centuries to realize that cell membranes took the form of lipid bilayers, which consists of two rows of lipid molecules with their water-fearing “tails” standing end to end, and their water-loving “heads facing” outwards. In a paper recently published in *Biointerphases*, Ralf Zimmerman and his colleagues carefully describe how the charge of lipid bilayer supported on a silicon surface – one of many models for a real cell membrane – changes in response to the external environment.

The charge in a lipid bilayer is important to understand because it determines how proteins can bind to the membrane, how cells attach to surfaces and how drugs or DNA can be delivered inside a cell. The researchers discovered that the charge in the bilayer changed dramatically as they varied the acidity of the external salt solution. They also found that the charge could drive alterations in the fluidity of the bilayer.

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By understanding the charges in this controlled lipid bilayer system, Dr. Zimmerman and his colleagues have opened a window into the far more complex world of real membranes. Because of how bilayers respond to the external environment, they have also demonstrated that lipid bilayers may have applications as biological sensors to detect anything from changes in acidity to protein binding. A hundred years after their discovery, lipid bilayers look set to stay in the news.

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“Charging and structure of zwitterionic supported bilayer lipid membranes studied by streaming current measurements, fluorescence microscopy, and attenuated total reflection Fourier transform infrared spectroscopy,” Ralf Zimmermann, David Küttner, Lars Renner, Martin Kaufmann, Jan Zitzmann, Martin Müller, and Carsten Werner