DESCRIPTION

An overview of recent experimental and theoretical developments in the field of the physics of membranes, including new insights from the past decade.

The author uses classical thermal physics and physical chemistry to explain our current understanding of the membrane. He looks at domain and 'raft' formation, and discusses it in the context of thermal fluctuations that express themselves in heat capacity and elastic constants. Further topics are lipid-protein interactions, protein binding, and the effect of sterols and anesthetics. Many seemingly unrelated properties of membranes are shown to be intimately intertwined, leading for instance to a coupling between membrane state, domain formation and vesicular shape. This also applies to non-equilibrium phenomena like the propagation of density pulses during nerve activity.

Also included is a discussion of the application of computer simulations on membranes.

For both students and researchers of biophysics, biochemistry, physical chemistry, and soft matter physics.

ABOUT THE AUTHOR

Thomas Heimburg received his Ph.D. in physics and his habilitation in biophysics both from the Physics Department of the University of Göttingen, Germany. He was a Heisenberg Fellow of the German Research Council (Deutsche Forschungsgemeinschaft) at the Max Planck Institute for Biophysical Chemistry in Göttingen and head of the independent research...
group "Membrane Biophysics & Thermodynamics". He was appointed associate professor in the Physics Department of the University of Göttingen. Now he is associate professor for biophysics at the Niels Bohr Institute of the University of Copenhagen and head of the Membrane Biophysics Group.

His primary research interests are experimental and theoretical thermodynamics and spectroscopy of artificial and biological membranes with a special focus on cooperative phenomena in biomembranes.