



**MATERIALS DEPARTMENT / MRL
JOINT COLLOQUIUM**

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“Life in elastic shells”

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Abstract

Cells are highly crowded assemblies of functional organelles enclosed by soft elastic shells. These 2-3 nm thick leaflets are composed of multi component lipid-protein alloys and host many of life's elementary processes. These include enzymatic reactions, hormone and photon triggered signal amplification and cell-cell recognition processes. The reduction in dimensionality renders these biochemical processes highly efficient and facilitates the signal transmission between the outside world and the cytoplasmic space of cells.

The lecture deals with the unique mechanical properties of biomembranes and their key role for the regulation of numerous cellular processes. Three aspects of this very rich and fascinating physics of living material research will be discussed.

1. The generation and role of functional domains in this two-dimensional multicomponent system by interplay of specific thermodynamic and elastic forces.
2. The stabilization of distinct cellular shapes and the control of shape transitions mediating intracellular trafficking by the curvature elasticity.
3. The control of cell adhesion processes by the interplay of elastic stresses, specific lock-and key forces and universal interfacial interactions.