

# Viscoelastic properties of cells and cellular cortices

Andreas Janshoff

*Institute of Physical Chemistry, University of Göttingen*

The mechanical properties of cells influence their shape and cellular functions, including cell adhesion, migration, growth, and differentiation. Cellular elasticity and cortex structure are found to be inherently interwoven and largely responsible for the cells' response to external mechanical stimuli.

We propose a shell-based tension-model to describe the mechanical response of cells to external probing and examined the impact of cell-size, cortex integrity, cortex attachment to the plasma membrane, cell-substrate adhesion, cell-cell-contacts and motor activity on the viscoelastic properties of cells.

In order to unequivocally relate the viscoelastic properties found for living cells to the mechanics of the cellular cortex we devised a top-down strategy to measure the viscoelasticity of isolated cortices. We found that the mechanical properties of isolated cortices resemble those of living cells, however, with a stiffening effect that can be resolved by invoking motor activity externally.