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Temperature dependence of optically induced cell deformations[1]
ANATOL FRITSCH, TOBIAS R. KIESSLING, ROLAND STANGE, JOSEF A. KAES, University of Leipzig, Division of Soft Matter Physics — The mechanical properties of any material change with temperature, hence this must be true for cellular material. In biology many functions are known to undergo modulations with temperature, like myosin motor activity, mechanical properties of actin filament solutions, CO2 uptake of cultured cells or sex determination of several species. As mechanical properties of living cells are considered to play an important role in many cell functions it is surprising that only little is known on how the rheology of single cells is affected by temperature. We report the systematic temperature dependence of single cell deformations in Optical Stretcher (OS) measurements. The temperature is changed on a scale of about 20 minutes up to hours and compared to defined temperature shocks in the range of milliseconds. Thereby, a strong temperature dependence of the mechanics of single suspended cells is revealed. We conclude that the observable differences arise rather from viscosity changes of the cytosol than from structural changes of the cytoskeleton. These findings have implications for the interpretation of many rheological measurements, especially for laser based approaches in biological studies.

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