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**Cytoskeletal mechanics: Structure and Dynamics**

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The actin cytoskeleton, a dynamic network of semiflexible filaments and associated regulatory proteins, is responsible for the extraordinary viscoelastic properties of cells. Especially for cellular motility the controlled self assembly to defined structures and the dynamic reorganization on different time scales are of outstanding importance. A prominent example for the controlled self assembly are actin bundles: in many cytoskeletal processes cells rely on the tight control of the structural and mechanical properties of the actin bundles. Using an *in vitro* model system we show that size control relies on a mismatch between the helical structure of individual actin filaments and the packing symmetry within bundles. While such self assembled structure may evoke the picture of a static network the contrary is the case: the cytoskeleton is highly dynamic and a constant remodeling takes place in vivo. Such dynamic reorganization of the cytoskeleton relies on the non-static nature of single actin/ABP bonds. Here, we study the thermal and forced unbinding events of individual ABP in such *in vitro* networks. The binding kinetics of the transient crosslinkers determines the mechanical response of such networks – in the linear as well in the non-linear regime. These effects are important prerequisites for the high adaptability of cells and at the same time might be the molecular mechanism employed by them for mechanosensing.