# From single molecule to medical applications - a new AFM toolkit for the nanoscopic investigation of mechanics, structures and dynamic processes in life science.

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The ability of Atomic Force Microscopy (AFM) to obtain three-dimensional topography images of biological molecules and complexes with nanometer resolution and under near-physiological conditions remains unmatched by other imaging techniques.
Our newly developed scanner technology not only enables the high-speed study of the time-resolved dynamics associated with molecular and cellular processes, it's state-of-the-art capabilities and compact design also allow full integration of AFM into advanced commercially available light microscopy techniques.

We will focus on how these advances can be applied to study a wide-range of biological samples, from individual biomolecules to mammalian cells and tissues in real-time, in-situ experiments. We will present examples of how we are able to resolve the nanoscale structure of individual biomolecules at high-speed scan rates of up to 1,000 lines per second. Here we use DNA structures with specific termini which allow us to study the binding mechanisms of individual biomolecules. Furthermore, dissolution studies of drug crystals will be discussed together with its relevance in medical applications.

In addition, following the dynamic reorganization of the membrane-associated cytoskeleton of living cells at high-temporal and high-spatial resolution, and the topography of cell cultures is automatically mapped across the entire area of the microscope stage.
We will also discuss the full suite of BioAFM modes and accessories for studying the nanomechanical properties of cells and tissues, including direct correlation of multiparametric, quantitative AFM and super-resolution (STED) datasets.