

Un-conventional AFM: alternative ways to use the cantilever

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In addition to the standard Atomic Force Microscopy modalities (such as contact mode, tapping mode, peak force, force volume), in recent years several alternative (un-conventional) ways of exploiting its unique capabilities arise. We will show some of these alternative approaches with a special focus on the study of live biological specimen. The concept of un-conventional resides in the use of the AFM without looking for morphological information and without one of the three major requirements of this technique: the substrate, the tip, and the scanning procedure.

We will get rid of the substrate while exploiting the sensitivity of AFM cantilevers to develop a novel nanoscale sensor, called the nanomotion sensor, which we applied to characterize the movement of biological specimen directly attached to the cantilever.

We will get rid of the tip while fishing cells from a petri dish and expose them in solution to several stimuli while measuring their movements.

We will get rid of the scanner while measuring at specific locations the beating of cluster of cells that moves under the AFM tip (e.g. using the AFM tip as a force sensor that “reads” the movement of biological cells). For each of this “naïve” methodologies we will show some results and will discuss the range of applications to characterize living systems in innovative ways, well beyond morphology.