Detection of Long Chain Bio-Polymers using Atomic Force Microscopy

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Abstract:

The Atomic Force Microscope (AFM) is demonstrated as a detector for long chain polymers and soft organics on mineral surfaces. Long chain (linear) polymers have been proposed as a general bio-markers [1-3]. The AFM provides very sensitive detection of polymeric strands using the force spectroscopy mode of operation [4]. In this mode, the force is measured as the AFM tip makes intermittent contact with a polymeric sample. As polymer strands are pulled from the surface onto the AFM tip, a characteristic detachment signal is measured in the force-distance plot.

AFM force spectroscopy provides polymer length, folding information and is capable detecting single molecules. AFM force spectroscopy of synthetic proteins, fossils surfaces and algae on mineral surfaces are presented as test examples.

AFM instruments have flown on two space missions, the Phoenix MECA experiment and the Rosetta MIDAS experiment [5,6]. In addition to providing high resolution imaging, this work demonstrates a powerful new application of the AFM that is relevant to astrobiology missions.

References:


