

TAPPING MODE AFM OF HYALURONAN POLYSACCHARIDE ON MICA IN AIR: CONTROLLING THE MOLECULAR EXTENSION

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The anionic polysaccharide hyaluronan (HA) has been imaged in air on a mica surface, using tapping mode AFM. When extended on the surface by molecular combing, long linear chains could be observed, corresponding to fully stretched molecules. These molecules appear to lie on the surface of a smooth water layer, and their extension may be maintained by favorable interaction with ordered water at the surface. Extended chains were most commonly observed when the mica surface was equilibrated at ambient room humidity prior to sample application. When freshly cleaved mica was used, the predominant polysaccharide conformation was that of a loosely coiled semi-flexible chain, corresponding well with the solution structure of HA. In order to observe the coiled chains, hard tapping was used to penetrate the surface water layer. The polysaccharide chains appear to lie on a rugged terrain composed of ordered and disordered water microdomains. Thus the predominant conformation for HA observed by tapping mode AFM is strongly influenced by its interaction with, and location relative to, the ordered water layer at the mica surface.

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