PROBING MULTIVALENT HOST-GUEST COMPLEXES USING AFM

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Multivalent interactions are the biological answer to many problems such as recognition, immune response and structural arrangement[1]. Several artificial systems exploiting this phenomenon have been constructed, trying to mimic cell processes or in the search of new devices and material properties[2]. It is, however, not fully understood yet what the relationship is between the number of host-guest interactions and their combined binding force (i.e. the total binding force has been predicted to scale following from linear to harmonic laws[3-6]).

We aim to probe multivalent host-guest complexes using force spectroscopy (Fig 1)in order to achieve a better understanding of the dynamical properties of these assemblies. To do so, a model system is being developed using cyclodextrin printboards as multivalent receptors and synthetic guest molecules of different valency.

We measured the dissociation force of single adamantane-βcyclodextrin complexes where the adamantane moiety is connected to the AFM tip using different linkers (Fig 2). The magnitude of the measured binding forces is in well agreement with previously reported values[7] for this system. The continuation of this project will be focused on the probing of divalent and trivalent guests and optimization of the experimental conditions in order to control the guest surface density and prevention of unspecific interactions between probe and printboard.

References

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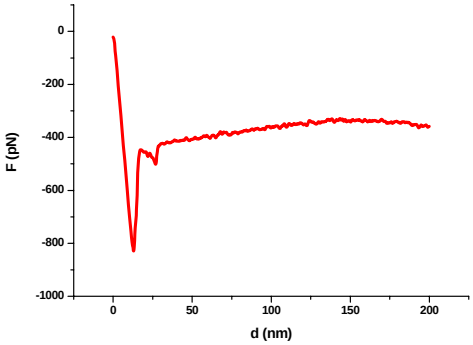

Figure 1: example of force – distance curve

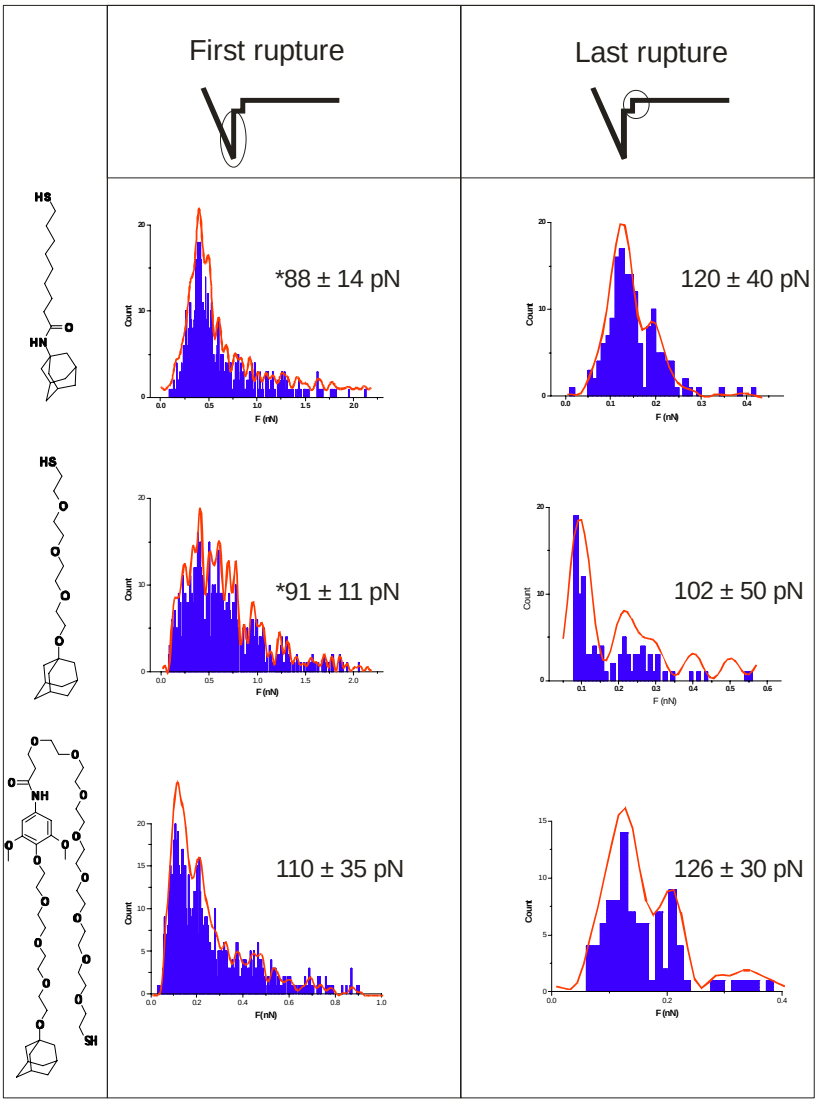

Figure 2: Measured binding forces between adamantane and β-cyclodextrin.
(*) Obtained from peak periodicity.