Electronic Supplementary Information

Protein adhesion regulated by the nanoscale surface conformation

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Procedure for estimating the adhesion energy

The adhesion energies required for detaching the protein-modified AFM tip from the substrates were estimated based on the force–distance curves shown in Fig. 4. The AFM tip radius was determined by scanning electron microscopy (FE-SEM S-4200, Hitachi). The image permits estimation of the surface area of the hemisphere of the AFM tip. The dimensions of HF and BSA were obtained from Ref. 22 and Ref. S1, respectively, and the surface areas were calculated based on the dimensions by assuming that the proteins were cuboids. For example, the surface area of BSA was estimated based on dimensions of 14 nm x 4 nm x 4 nm.[S1] The maximum number of protein molecules attached to the AFM tip was estimated by assuming that half of the protein surface was covered by the AFM tip. The adhesion energy was divided by the number of proteins on the AFM tip to estimate the adhesion energy required to detach one protein molecule from the OTS substrates.
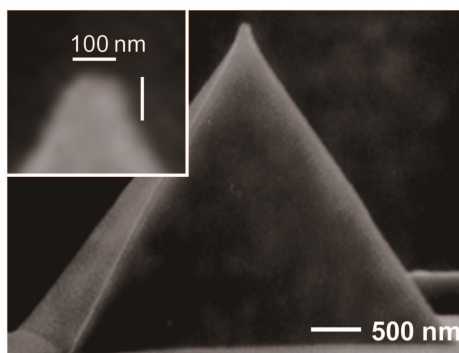

Fig. S1. Scanning electron microscopy image of the AFM tip used to measure the adhesion force between the protein-immobilized AFM tip and the OTS monolayer surfaces. The inset shows a magnified image of the tip region of the AFM tip. The diameter of the hemisphere was approximately 100 nm.

Reference

S1. A. K. Wright, M. R. Thompson, *Biophys. J.*, 1975, **15** ,137.