Methods for direct measurement of adhesion between capsules and human hair

Innovation in Encapsulation 2016

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Methods

- Flow chamber
  - Population of capsules
  - Different forces (Shear force, buoyancy…)
  - Not direct value

- Atomic force microscopy (AFM)
  - Single capsule
  - Normal force
  - Direct value

Flow chamber set up

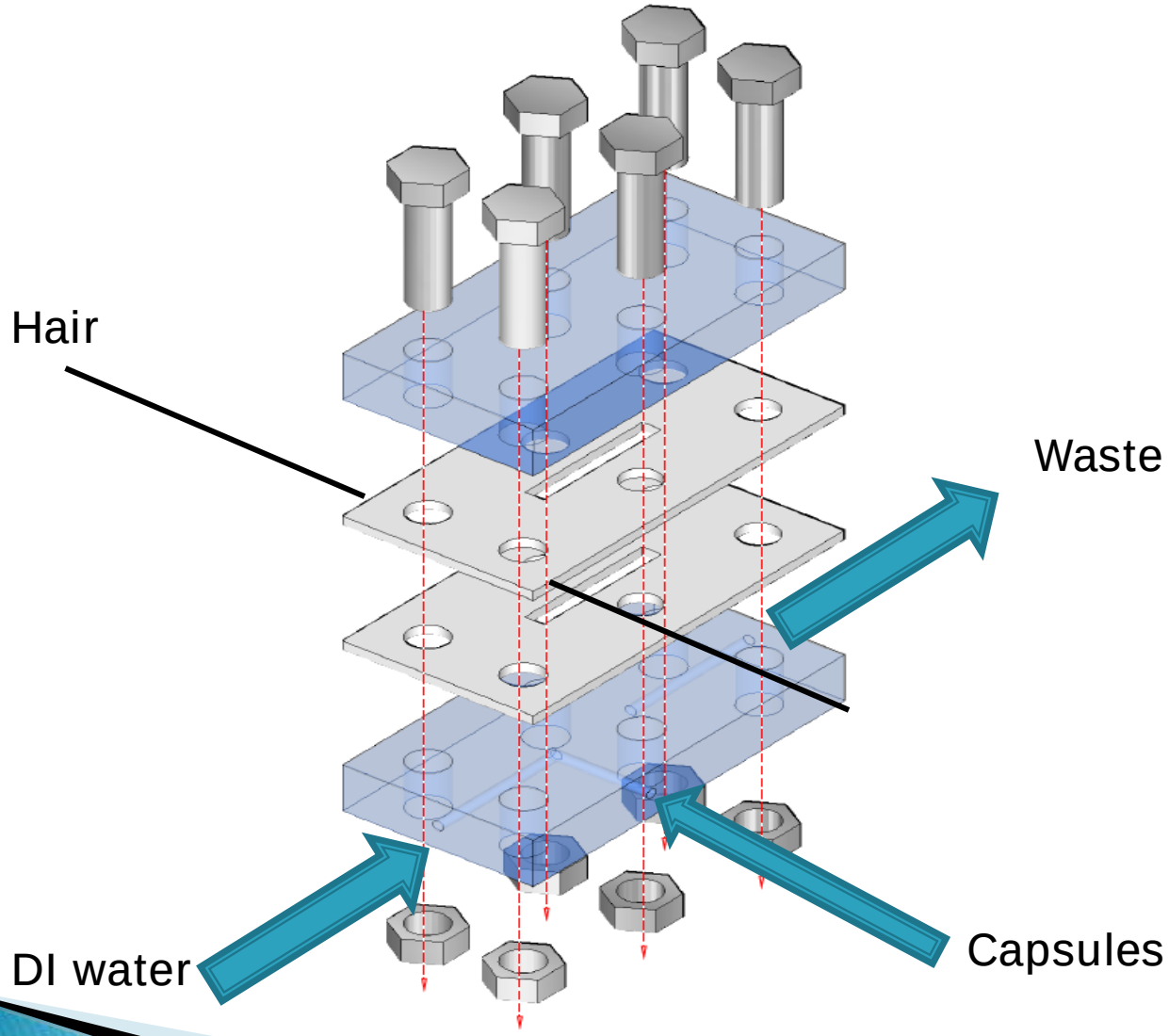
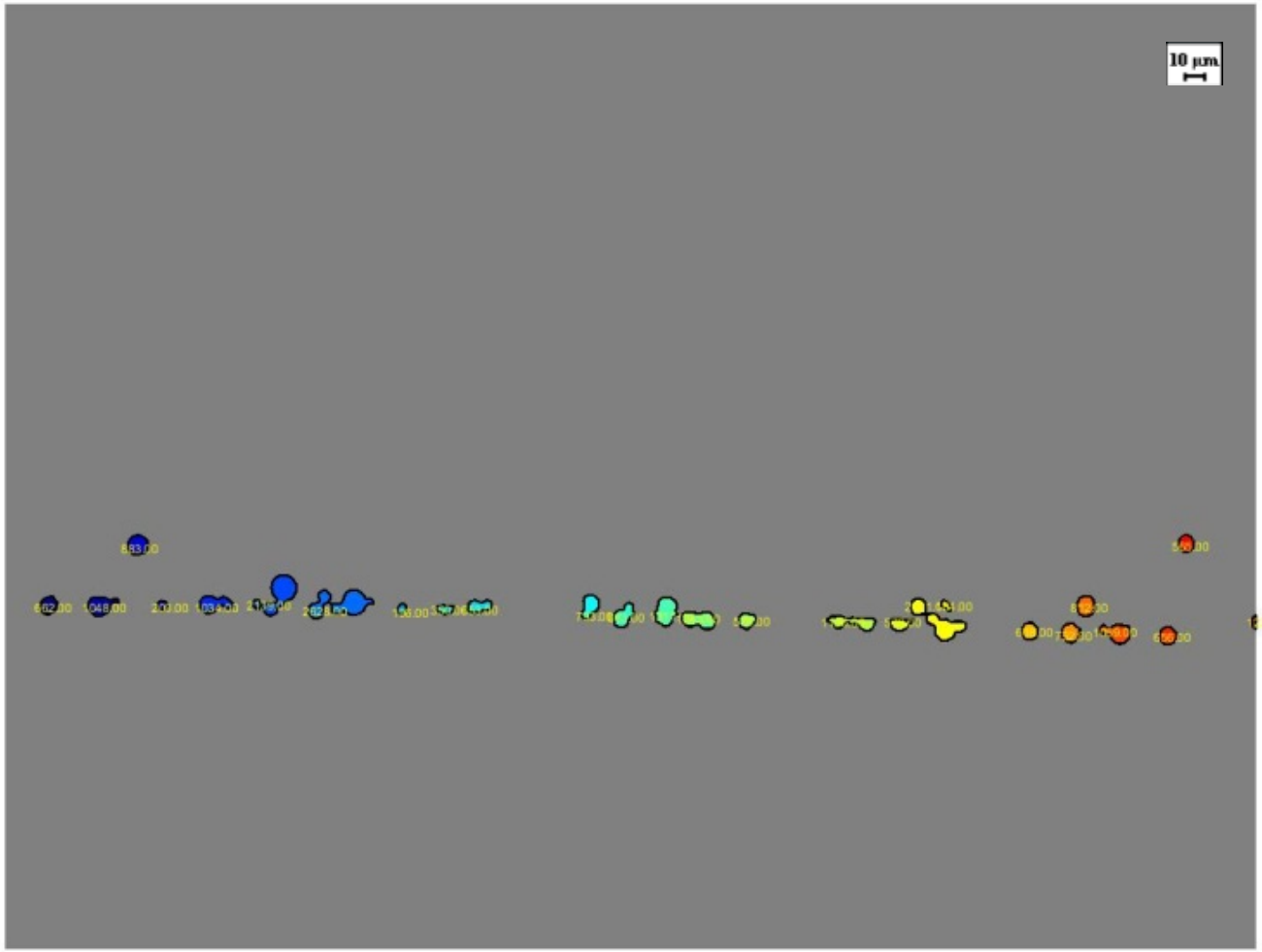
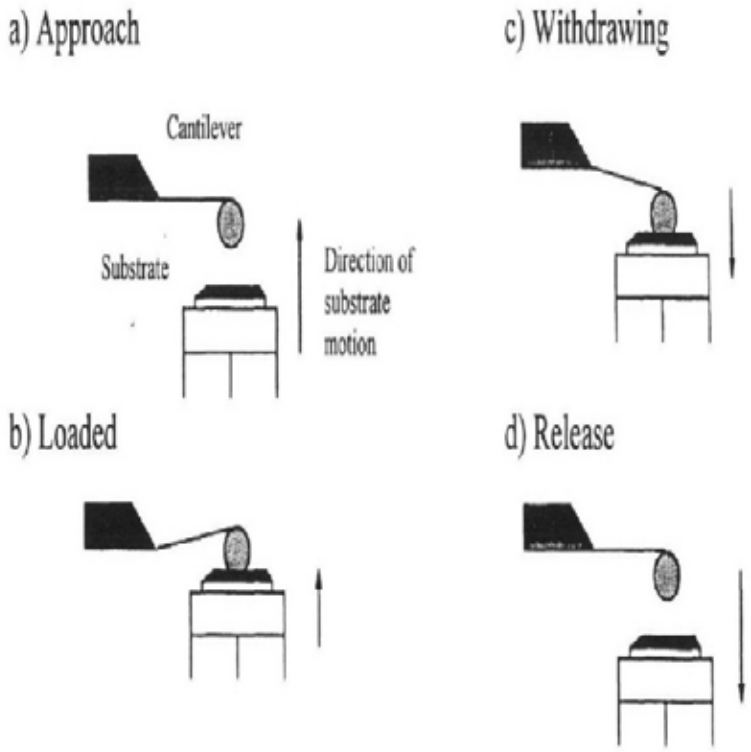
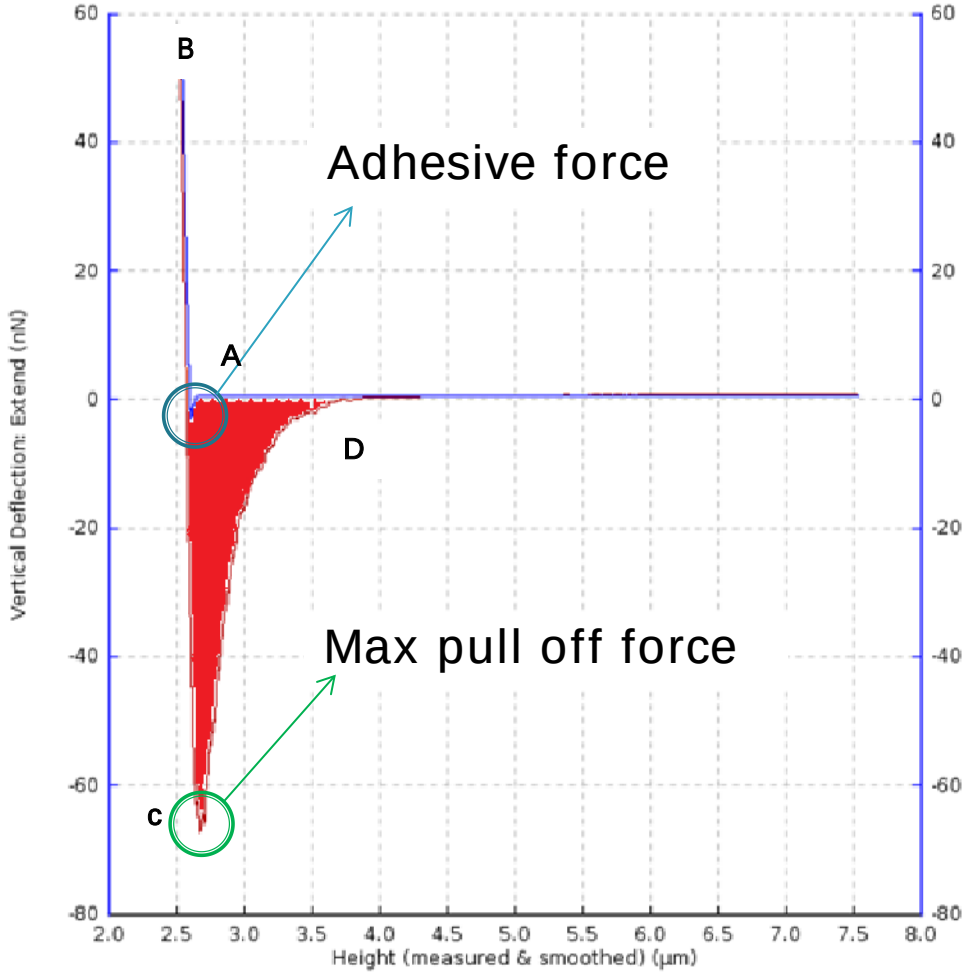


Image analysis

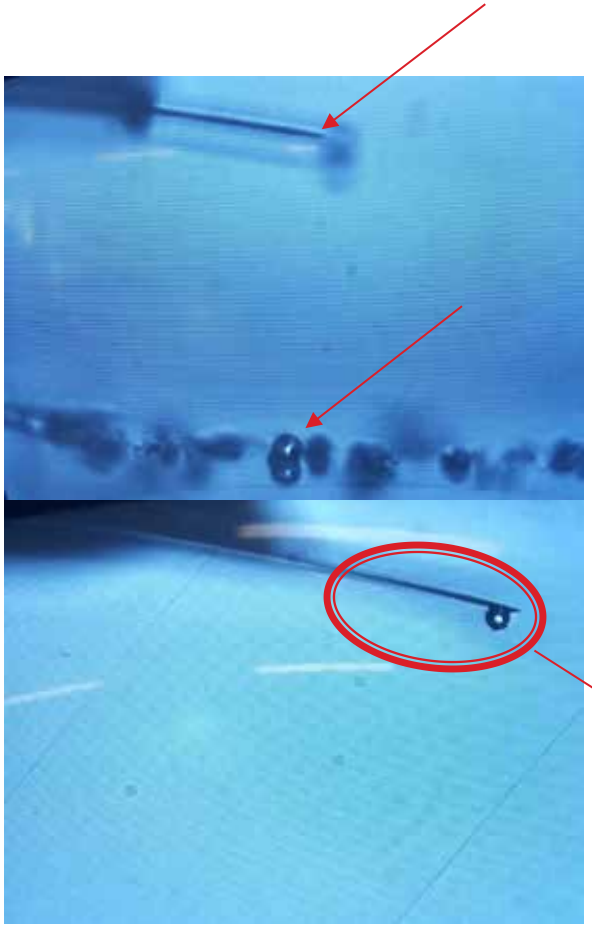


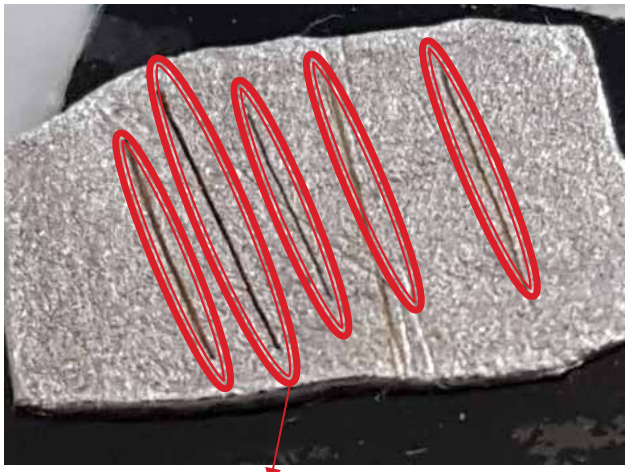
AFM

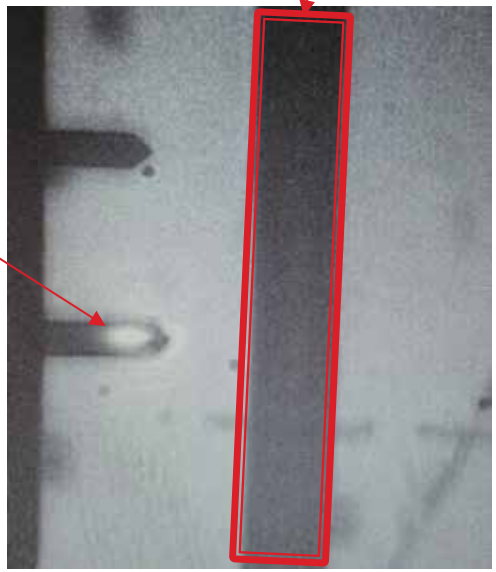

a) Approach
Cantilever
Substrate
Direction of substrate motion
b) Loaded
c) Withdrawing
d) Release


Adhesive force
Max pull off force
A
B
C
D
Vertical Deflection: Extend (nN)
Height (measured & smoothed) (µm)
60
40
20
0
-20
-40
-60
-80
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0

AFM sample preparation



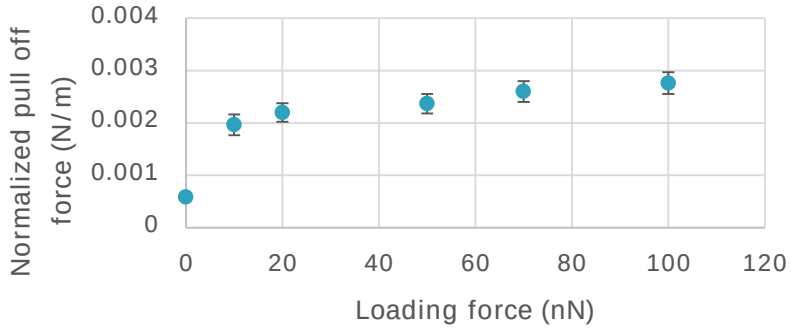




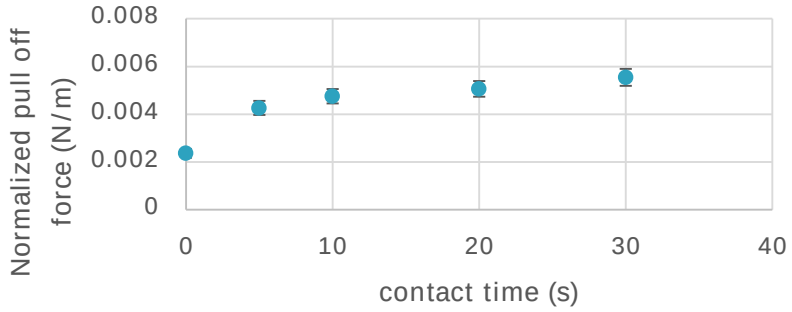
AFM experimental parameters

- Humidity
  - Dry conditions (Relative humidity: 30%-40%)
    - Van der Waals and Capillary forces
  - Immersed in water
    - Hydrophobic interactions

- Loading force

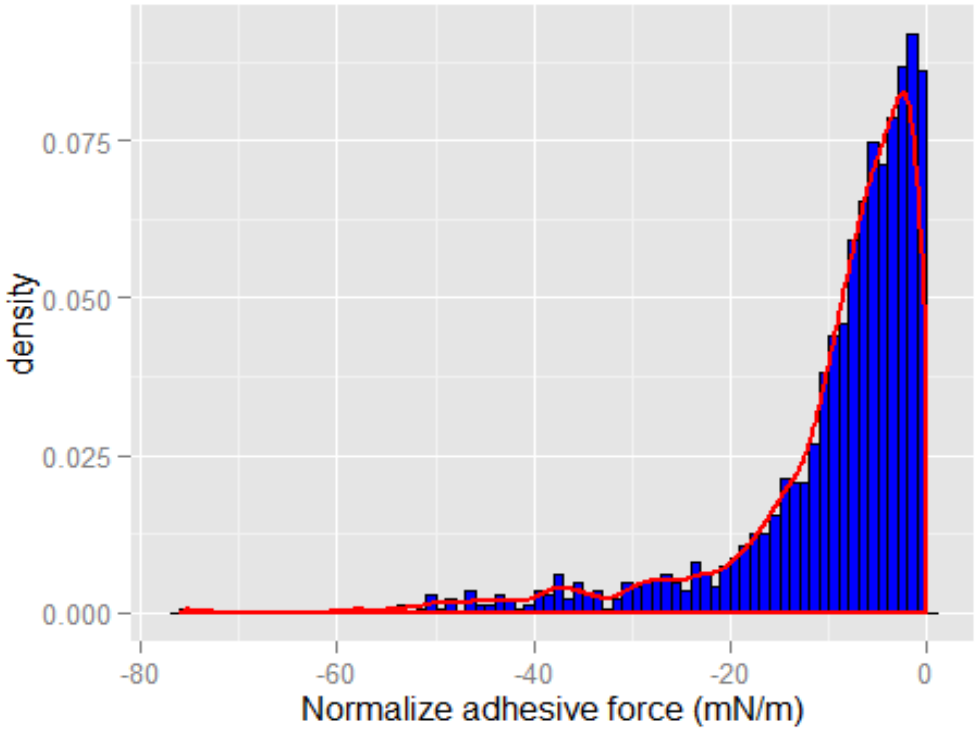


- Contact time



Distribution of AFM values

- A big skewness of the values
  - Median gives a better representation of the central tendency.



Acknowledgement

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Any Questions?