S3 Details on fiber radius measurement with AFM

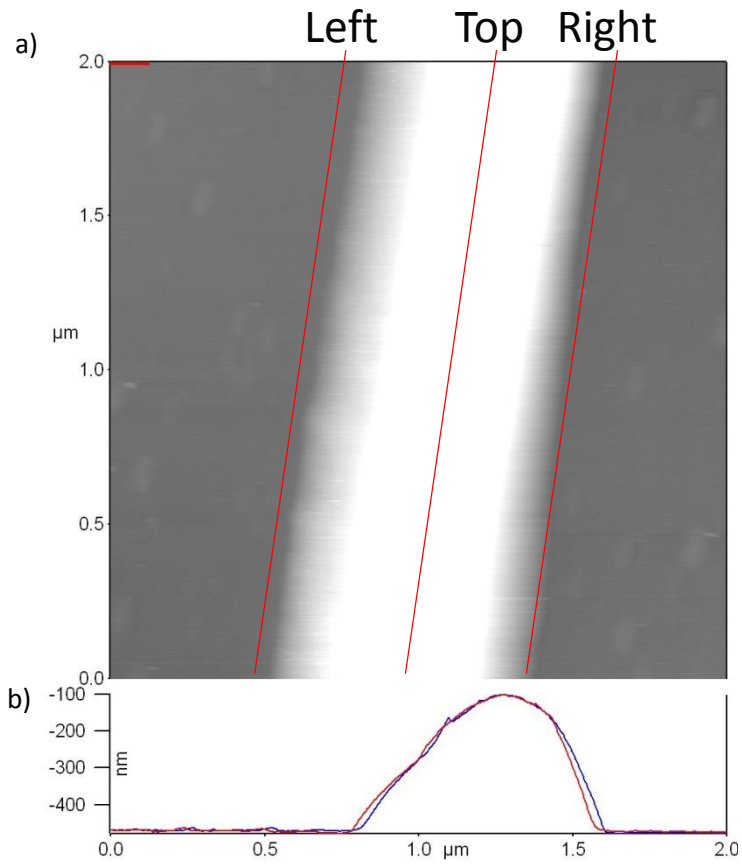

Figure D AFM scan of a fiber. a): 'Left', 'Top' and 'Right' are cross-sections used for calculation of the mean diameter. D-period is not visible only due to scale. b): Cross-section profile. The red and blue lines correspond to Height Trace and Height Retrace, respectively.

To calculate the diameter of the fiber we use the following formula:

$$Fibril\ diameter = Top\ Height(l) - \frac{Left\ Height(l) + Right\ Height(l)}{2} \qquad \text{Eq. H}$$

Here l is the coordinate along the fiber.

Additional way of checking the AFM settings is performing a deconvolution of the profile shape using the geometry of AFM tip (Figure E).

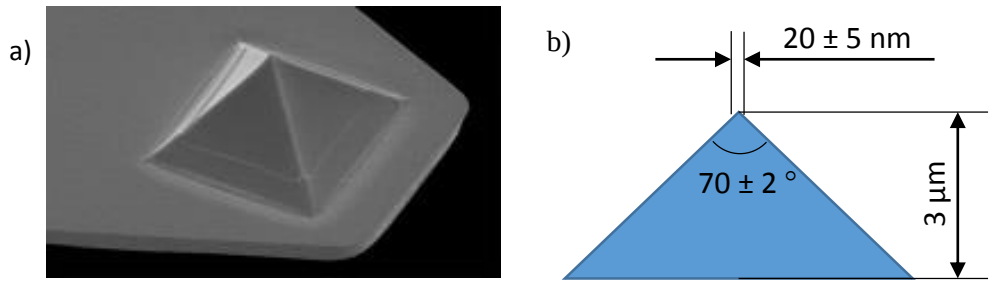

Figure E Olympus TR400PSA AFM tip geometry (a) and dimensions (b). (Data from http://www.asylumresearch.com/ProbeStore)

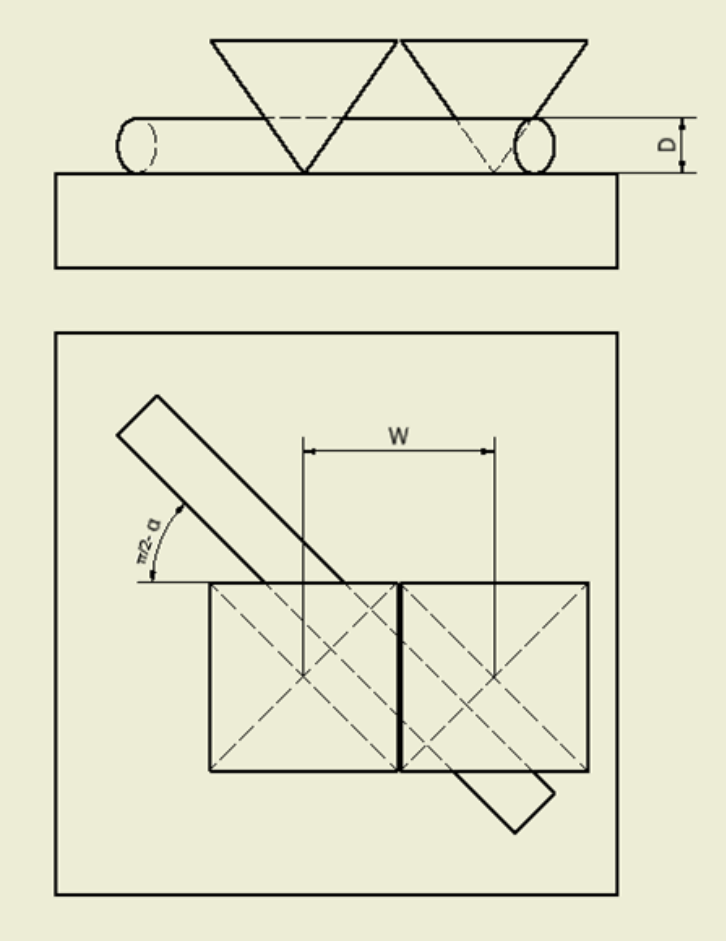

Figure F To AFM scan profile deconvolution

Based on simple geometrical model we derived the theoretical dependence of a relation between width (H) and height (D) of the cross-section profile (Figure D, b) on the angle between the fiber and horizontal axis α :

$$\frac{W}{D}=\frac{1}{\cos\alpha}\frac{1}{\tan\left(\frac{\left(\pi/2\right)-\tan^{-1}\left(\tan\left(7\pi/35\right)\cdot\left(\sin\alpha+\cos\alpha\right)\right)}{2}\right)} \qquad \text{Eq. I}$$

For vertical fiber ($\alpha=0$) the ratio is $W/D=1.921$.