

ICM Image of Suspended Collagen Fibrils

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Ion Conductance Microscopy (ICM)¹ is useful for obtaining contact-free images of the surface topography and has been used for imaging cultured cells under liquid conditions². The Approach-Retract-Scan (ARS) mode is a new mode of ICM, which is especially powerful for imaging samples with steep slopes³. To examine the applicability of the ARS mode for imaging biological samples with greater height gaps, dense collagen fibril networks were examined by ICM⁴.

Sample preparation

Collagen fibrils were obtained from the tail tendon of adult Wistar rats and stored in physiological saline with 1-10 % tymol (2-isopropyl-5-methylphenol) at 4 °C for a minimum of 1 day. A small piece of the tendon was then stretched on the surface and air dried overnight, followed by immersion of the sample in physiological saline. ICM imaging was made in the ARS mode using the XE-Bio System

Conclusion

Figure 1 is an example of ICM imaging of collagen fibril networks using the ARS mode. The width of the individual fibrils varied from 50 to 470 nm. The section profile also showed that the width of the collagen fibril indicated by green arrows was 277 nm and the height difference between the glass surface and the fibril was 2606 nm. This result indicates that some fibrils are suspended over the glass substrate during scanning for ICM imaging. Thus, the ARS mode of ICM has the advantage of minimizing (or free from) the loading force, which is unavoidable in AFM.

Reference

- ¹P. K. Hansma, B. Drake, O. Marti, S. A. Gould, C. B. Prater, *Science* **243**, 641 (1989).
- ²Y. E. Korchev, C. L. Bashford, M. Milovanovic, I. Vodyanoy, M. J. Lab, *Biophys. J.* **73**, 653 (1997).
- ³P. Novak, C. Li, A. I. Shevchuk, R. Stepanyan, M. Caldwell, S. Hughes, T. G. Smart, *et al.* *Nat. Methods* **6**, 279 (2009).
- ⁴T. Ushiki, M. Nakajima, M. Choi, S.-J. Cho, F. Iwata. *Micron* (2012, in press)

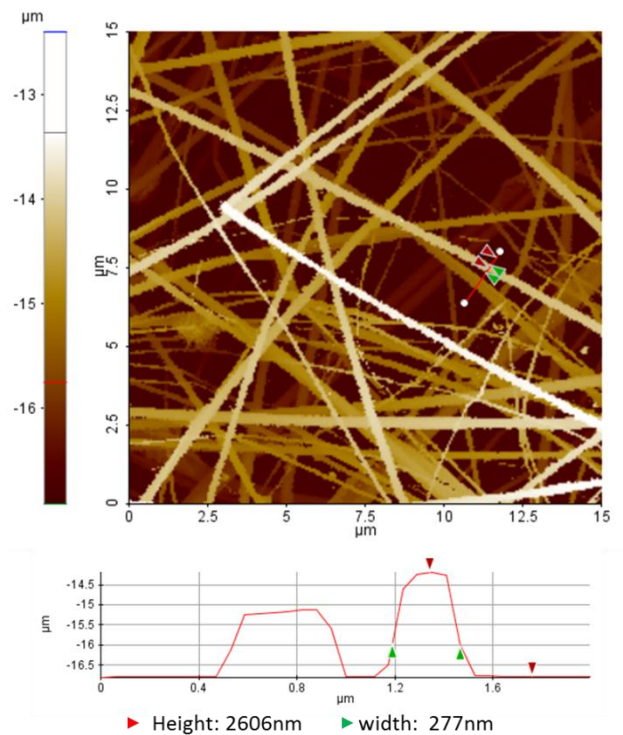


Figure 1 Dense collagen fibril networks imaged by the ARS/hopping ICM. Line profile analysis is based on the red line indicated in the ICM image.