18:30 – 18:55

Quantitative nanomechanical mapping of tissues by dynamic atomic force microscopy

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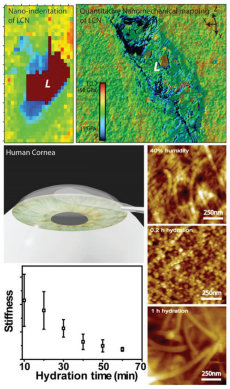

Quantitative nanomechanical mapping by dynamic atomic force microscopy (AFM) is a quite important development in nanotechnology and nanocharacterization. In biophysical field, it not only provides the opportunities to probe the topography of various biological species under physiological environment, but it also enables researchers to understand the relevant physical/chemical properties quantitatively, basing on the force measurements.[1] After more than ten-year development, such quantitative nanomechanical mapping has led to numerous discoveries in life science, such as providing the fine structures of protein self-assembly structures[2] and localizing the functional sites on cellular membrane. However, the reports of the applications on tissue level are still rare. In this presentation, we would like to share our recent applications of quantitative nanomechanical mapping to understand the roles of osteocytes and lacunar-canalicular network (LCN) in regulating bone quality and calcium homeostasis, and to figure out the hydration effects to human corneal[3].

References

[1] Zhang, S.; Aslan, H.; Besenbacher, F.; Dong, M., Quantitative biomolecular imaging by dynamic nanomechanical mapping. *Chemical Society Reviews* 2014.

[2] Zhang, S.; Andreasen, M.; Nielsen, J. T.; Liu, L.; Nielsen, E. H.; Song, J.; Ji, G.; Sun, F.; Skrydstrup, T.; Besenbacher, F.; Nielsen, N. C.; Otzen, D. E.; Dong, M., Coexistence of ribbon and helical fibrils originating

from hIAPP20–29 revealed by quantitative nanomechanical atomic force microscopy. *Proceedings of the National Academy of Sciences* 2013.

[3] Xia, D.; Zhang, S.; Hjortdal, J. Ø.; Li, Q.; Thomsen, K.; Chevallier, J.; Besenbacher, F.; Dong, M., Hydrated Human Corneal Stroma Revealed by Quantitative Dynamic Atomic Force Microscopy at Nanoscale. ***ACS Nano*** 2014.