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Nano-indentation experiments: from viruses to cells WOUTER ROOS, DAAN VORSELEN, Department of Physics and Astronomy, VU University, Amsterdam, The Netherlands, JACK VAN LOON, DESC, Department of Oral Cell Biology, ACTA-VU University, Amsterdam, The Netherlands, GIJS WUITE, Department of Physics and Astronomy, VU University, Amsterdam, The Netherlands — Over the last years AFM imaging and nanoindentation have become an indispensable tool for biophysical studies in liquid at the nano- and micro-scale. We look at both these length scales, at the cellular as well as the sub-cellular level. In particular, we perform combined imaging and force spectroscopy experiments on viral particles to elucidate their structure and mechanics [1]. These studies revealed that Noro virus has found an intriguing way to increase its mechanical strength. These self-assembling, natural nanoparticles incorporate a pre-stress during assembly, consolidating the structure of its protein shell that protects the genome [2]. Next, we studied whole cells. Mechanical loading is increasingly recognized as an important stimulus to cells. Establishing the local viscoelastic properties within a cell is vital to the understanding of the underlying mechanisms of cytoskeletal changes in response to these stimuli. We study the mechanical response of mammalian bone forming (osteoblast-like) cells on a substrate of physiological stiffness using spherical, μm-sized probes and we compare these results to the properties of bone forming cells originating from fish (teleosts).

[1] Roos et al. Nature Physics (2010), 6:733
[2] Baclayon et al. Nano Letters (2011), 11:4865

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