The atomic force microscope (AFM) has become a powerful tool in structural biology allowing the investigation of biological samples under native-like conditions: experiments are performed in physiological buffer at room temperature and under normal pressure. Topographies of membrane proteins can be acquired at a lateral resolution of ~10Å and a vertical resolution of ~1Å. Importantly, the AFM features an extraordinary signal-to-noise ratio allowing imaging of individual membrane proteins in prokaryotic \(^1\) and eukaryotic \(^2\) native membranes that participate in supramolecular assemblies. These images can be docked with high precision by high-resolution structures resulting in atomic models of multiple proteins working together. The development of a novel 2-chamber AFM setup, in which membranes are deposited on nano-patterned surfaces, allows probing non-supported functional membrane proteins \(^3\).

1) Chromatic adaptation of photosynthetic membranes. Science, 2005, 309, 5733, 484-487
Simon Scheuring* & James Sturgis

2) The supramolecular architecture of junctional microdomains in native lens membranes. EMBO R., 2007, 8, 1, doi:10.1038/sj.embor.7400858
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