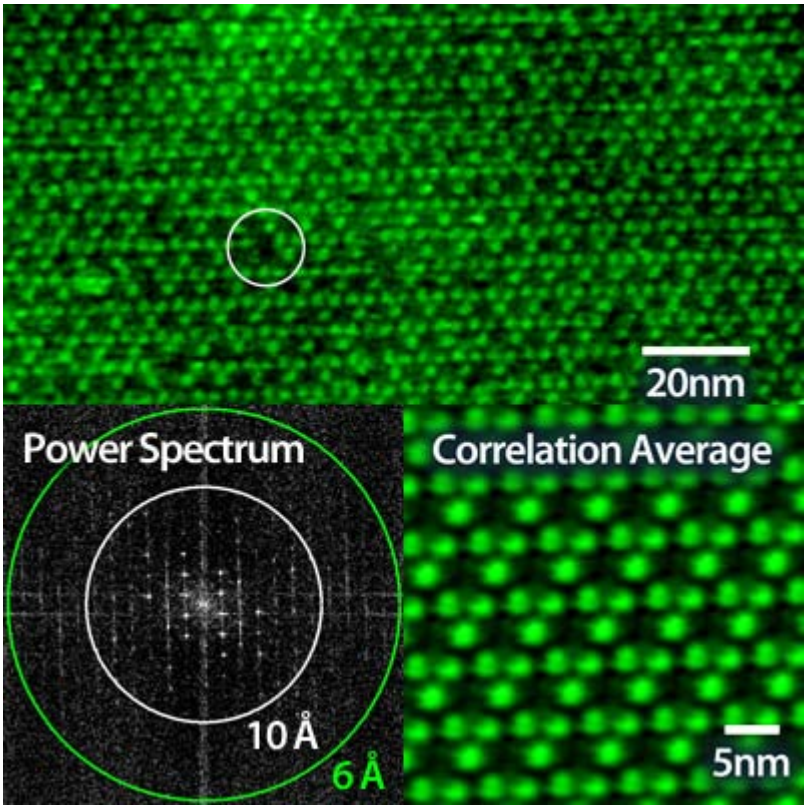
Smaller and Quieter: Ultra-High Resolution AFM Imaging

PRESENTER: DR. MICK PHILLIPS – ASYLUM RESEARCH UK LTD

Miniaturization of cantilevers for Atomic Force Microscopy has increased their resonant frequencies and decreased their thermal noise, allowing faster, lower noise measurements. When used in the extremely low-noise Cypher AFM, these levers have enabled significant improvements in imaging resolution in air and especially in liquids. On crystals, individual atomic point defects can now be routinely resolved and this higher resolution also extends to biological samples. Examples shown include the movement of individual point defects in bacteriorhodopsin, atomic point defects in calcite, and resolution of the double-helix structure of DNA in solution.



Bacteriorhodopsin imaged with the Cypher AFM in AC mode using a short cantilever. In the original AFM image (top) missing sub-units are easily resolved (white circle) and its power spectrum shows spots out to 6 Angstroms, demonstrating sub-nanometer resolution. The lower right image is a correlation average of the original image. Imaged with the Cypher AFM.