

High Sensitivity Bio-sensing in Liquids with Resonant Mode Cantilevers

Abstract: Resonant cantilevers have already demonstrated unprecedented sub-femtogram mass sensitivity in the detection of biomolecules in air or vacuum environment. But both sensitivity and reliability of measurements in liquid media, where many biological processes occur, remain a problem. Following a three-pronged approach, we have achieved highly sensitive reliable detection of biomolecules in liquids using cantilevers. This involved improving the measurement and data analysis techniques; optimizing the surface functionalisation (immobilisation) protocol for maximum attachment; and finally using higher resonant modes of smaller cantilevers to reduce the effect of damping. These techniques have been used for investigating two different systems: antibody/antigen and triglycerides.