

Surface Forces Apparatus (SFA) and its application to intermolecular forces measurement in wet conditions

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The surface forces apparatus (SFA) has been used for many years to measure the physical forces between surfaces, such as van der Waals, electrostatic forces, adhesion forces, ligand-receptor interactions, friction and lubrication force. Currently, the SFA technique is quite demanding for interdisciplinary area of physics, chemistry, biology, materials science, and chemical engineering. However, only a handful of labs worldwide are equipped with functional SFAs and no SFA is available in South Korea due to long training time for skillful operation and tricky data process. The SFA measures the magnitude and distance of the intermolecular forces between two atomically smooth surfaces by approaching, retracting or shearing from one another. Forces are measured with a resolution of 10nN and the separations are determined with 0.1 nm resolution by multiple beam interference fringes of equal chromatic order (FEKO). A base surface for the SFA studies is usually mica but adsorbing or depositing a thin film of some other materials, i.e., lipid layers, metal oxides, polymer films including proteins and carbohydrate have been also used in the SFA.