

Study of the Nano-Mechanical Response of the Ligand-Receptor Interaction between Influenza Hemagglutinin and Host Cell

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In the last decade micromechanical cantilever (MC) based sensor emerged as a new sensing technique complementary to conventional sensor systems. MC can be used as microbalance or chemical transducer if a sensitive layer is deposited on the MC's surface. The type of coating gives the selectivity and the sensitivity of the sensor to different stimulation. The MC is set into vibration by magnetic excitation, and oscillation parameters such as frequency shift, amplitude and phase are monitored. Change of the cantilever oscillation is related to variations of either cantilever mass, surface stress, viscosity near the surface[2-3]. It has been demonstrated that molecular recognition on the cantilever surface alters the cantilever resonance frequency. We have used this principle for measurement of ligand-receptor interaction between influenza virus hemagglutinin (HA) and specific sugar chain, which exist on host cell surface. In the case of human influenza (Type A, strain MRC-11, H3N2), sialyllactose (NuAc(α 2-6)Gal(1-4)Gal) is major component. We have synthesized sialyllactose containing alkanethiole molecule, and the recognition event between virus and host cell mimic glycolipid monolayer has been studied using frequency modulation AFM technique.

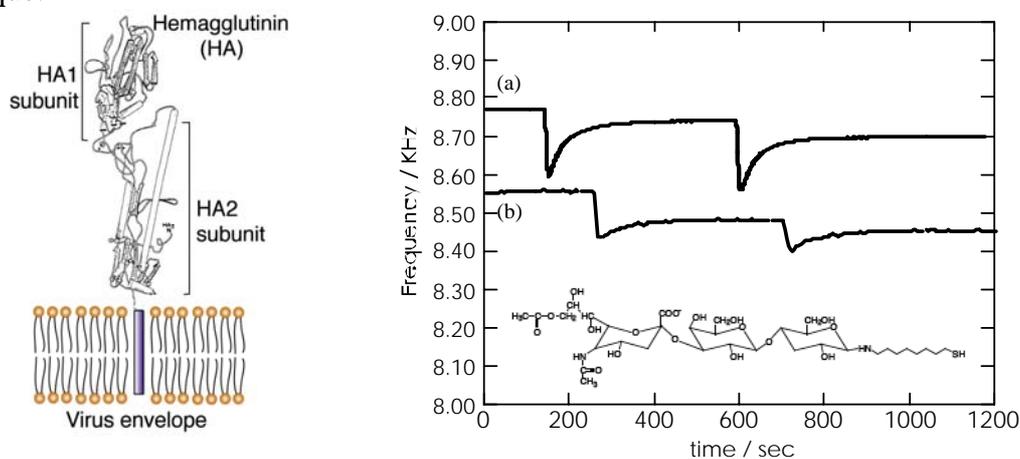


Fig. 1 Schematic illustration of Influenza Hemagglutinin (HA) monomer. HA forms trimer at the virus particle.[1] The HA1 part has binding affinity to sialic acid moiety.

Fig. 2 Time course of sialic acid coated MC sensor's frequency response. (a) Virus suspension (0.02 μ g/ml in PBS buffer, MRC-11) was injected to PBS buffer. (b) Same virus concentration but solution was containing neuraminidase inhibitor (0.5mM Tamiflu).

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