

PM-IRRAS and AFM Studies on Modified ssDNA Adsorbed on Gold

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Polarization modulation infrared reflection adsorption spectroscopy (PM-IRRAS) is a highly surface specific FT-IR method that is capable of detecting chemical compositions from interfacial films down to one molecule thin films [1]. The PM-IRRAS technology enables the measuring spectra of materials because of the differences in the reflection of p- and s-polarized light from interfaces – only p-component radiation interacts with the surface of sample [2]. The PM-IRRAS technique allows enhanced detection on substrates and measurements from the air-water interface. Changes in the PM-IRRAS signal intensity and position can be used to infer molecular absorption/desorption behaviour and kinetics, molecular packing, phase transitions, hydration, hydrogen bonding and different surface reactions in a thin film. Additionally in PM-IRRAS the properties of the polarized light can be used to determine the molecular orientation in a film [3].

Here we present the studies on ssDNA consisting of 20 molecules of adenine adsorbed on flat gold surface, also modified with thiol and anion groups at the 5' ending. Atomic force microscopy images were measured to confirm the presence of ssDNA on the surface together with its distribution. The influence of the presence of complimentary ssDNA in the sample on the PM-IRRAS signal was tested due to investigate the hybridization process.

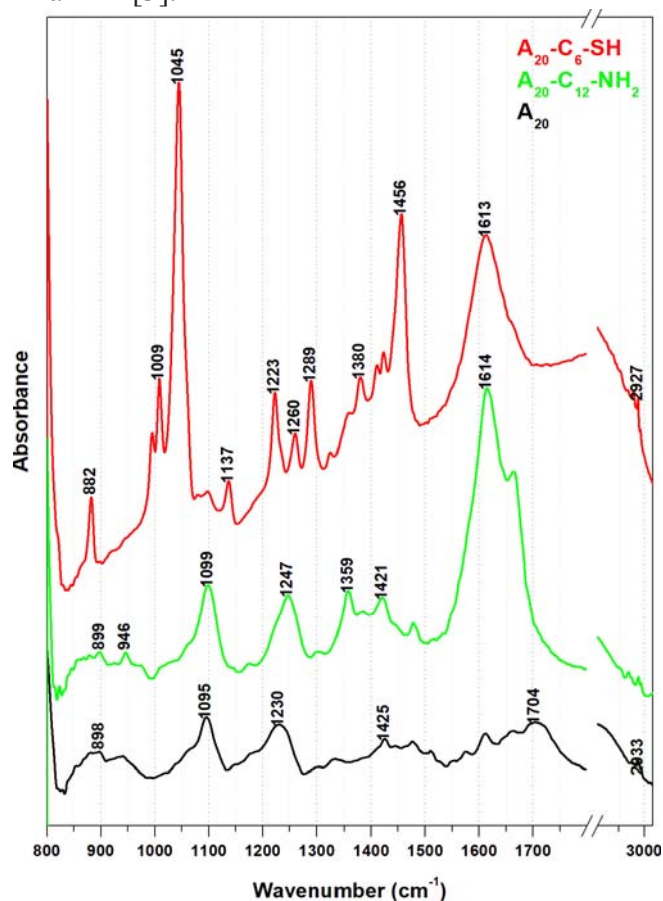


Figure 1. PM-IRRAS spectra of 5'-AAAAAAAAAAAAAAAAAAAAAAAA-3'(A₂₀) molecule and its thiol (A₂₀-C₆-SH) and amine (A₂₀-C₁₂-NH₂) modifications.

References

- [1] T. Buffeteau et al., *Applied Spectroscopy* 45, 380-389 (1991).
- [2] Alkire, Kolb, Lipkowski, Ross (eds.): *Diffraction and Spectroscopic Methods in Electrochemistry*, Wiley-Vch (2006).
- [3] R. Arnold et al., *Langmuir* 17, 4980-4989 (2001).