THE AFM VISUALIZATION OF THE LDL ON THE Au (111) SUBSTRATE

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The low density lipoprotein (LDL) is known as the best vehicle for cholesterol transport inside the human body. As so far known, it is a positively charged spherical particle with 25 nm of diameter. Inside arteries, can deposit into solid plaque, causing a disease known as atherosclerosis. By general conditions it is characterized by thickening, hardening, and loss of elasticity of the walls of the blood arteries. In order to understand the mechanism of the LDL plaque formation, more data about LDL interaction are necessary[1],[2],[3],[4]. The atomic force microscope (AFM) is an instrument of modern nanotechnology, molecular and surface science, capable to visualized molecular aggregates with low conductivity, revealing topography of surface at molecular scale[5]. It can operate in variety of media, including aqueous, which is of a special importance for visualization of the biological surfaces. Here in our study, samples of LDL were fixed at the atomically flat Au (111) substrate. Preparation was curried out from diluted physiological solutions: $8x10^{-14}$ M LDL at 37 °C. For visualization, in air, Nanoscope III, Multimode AFM was used. The high resolution images reveled the individual LDL molecules, as well as aggregates of LDL, which all show great affinity towards the gold terraces, because of there's hydrophilic character. Regarding to shape and size of majority of the LDL aggregates, the preferential are those consisted from four individual molecules (Figure 1). By use of the molecular models, conclusions about the aggregation mechanism and interpretation of the obtained images are achieved. Results of this particular study, could be significant step into understanding of the arterial plaque formation mechanism.

References

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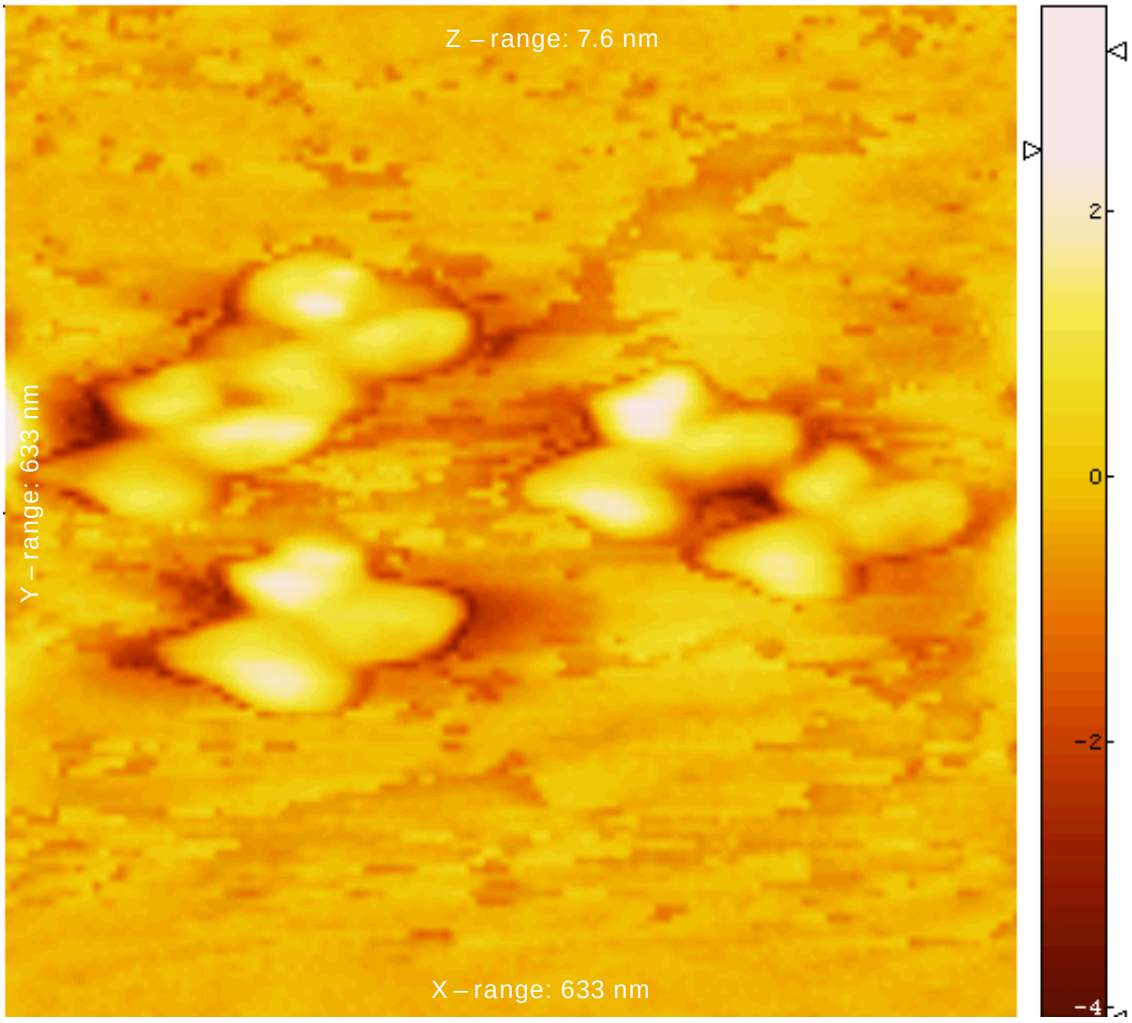

Figure 1. High resolution AFM image of the LDL tetramer on the gold substrate ($8x10^{-14}$ M) in water solution at 37 °C. Size: X= 633 nm, Y= 633 nm, Z= 7.6 nm