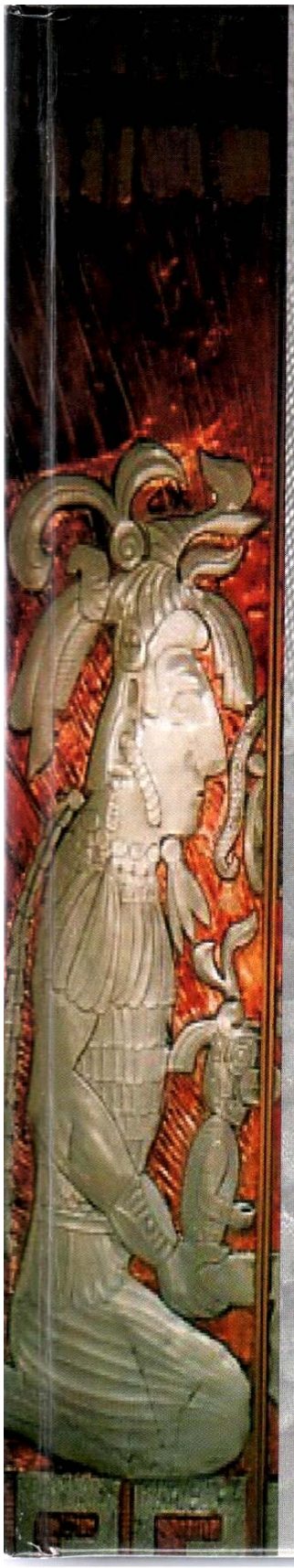

XIII INTERNATIONAL MATERIALS RESEARCH CONGRESS

ACADEMIA MEXICANA DE CIENCIA DE MATERIALES, A.C.

VII National Congress of the Mexican Microscopy Association

I Iztapalapa Sol-Gel Science and Technology Congress

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IX Ibero-American Congress of Inorganic Chemistry

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VISUALIZATION OF CHOLESTEROL MOLECULES AT THE AU(111) SUBSTRATE IN FREE AND AGGREGATED FORMS BY STM AND AFM

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ABSTRACT

Cholesterol as molecular material is a very important and attractive object of study, because of it's importance in medicine and biology. It is one of the most important lipid in the cell membrane, which was previously extensively studied in it's free and associated forms (LDL, HDL, VDL). However, the knowledge related to mechanism of the inter-molecular and inter-aggregate interactions is still very limited. In particular, it seems it is a lack of information about a detail surface structure of HDL and LDL and way of interactions between aggregates. Recent development of new microscopy techniques which allow visualization of molecular material at the atomic level raised a new hope for better understanding of molecular interaction mechanisms an understanding of the functionality of the biological systems.

In study presented here we were dedicated to understand the general principle of the visualization of cholesterol molecules and major aggregates HDL, LDL (human isolated), by AFM and STM. As a first step, attention was focus at the sample preparation, involving: Au(111) substrate, different solvents and influence of concentration of the cholesterol in the solution related to quality of images. A new methodology is developed for preparation and visualization of monolayer thick cholesterol film, which was successfully visualized by AFM and STM, and characterized in great details. From the obtained images we could clearly see: structure of the adsorbed layer and evaluate position (orientation) of molecules at the solid substrate. The AFM analysis offered very useful data to understand size and shape and aggregation behavior of HDL and LDL. Experiments are in progress with especial focus to the imaging under biological conditions (in solution), which could give detail clue for the HDL and LDL surface structure at physiological conditions, at molecular level. The obtained results are compared and discussed in respect to the known literature findings (cryogenic SEM data).