A NOVEL APPROACH TO INVESTIGATE THE CRYSTALLINITY OF INDIVIDUAL METAL NANOPARTICLES

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Investigation of plasmonic nanoparticles is a hot topic nowadays, due to their outstanding properties which allow to apply them in different fields from fundamental physics to theranostics. Still this field is full of pitfalls, hence extracting as much information as possible is one of the main priorities. There are plenty of reports on the application of plasmonics, one particular field of interest is theranostics which is a promising area of medicine, materials science, physics, and chemistry that combines therapy and diagnosis on a single platform [1, 2]. Surface-enhanced Raman spectroscopy is used to track and find targeting foreign cells, meanwhile the photothermal effect induced with infrared illumination heats the nanoparticles to eliminate the selected cancer cells. It is worth to find out if changing the nanoparticles' crystallinity we can achieve a more efficient theranostic system. However, the critical question that arises is how to easily observe the crystallinity changes? This paper is aimed to review a novel approach of investigation of crystal structure changes with atomic force microscopy and dielectric force microscopy (DFM).

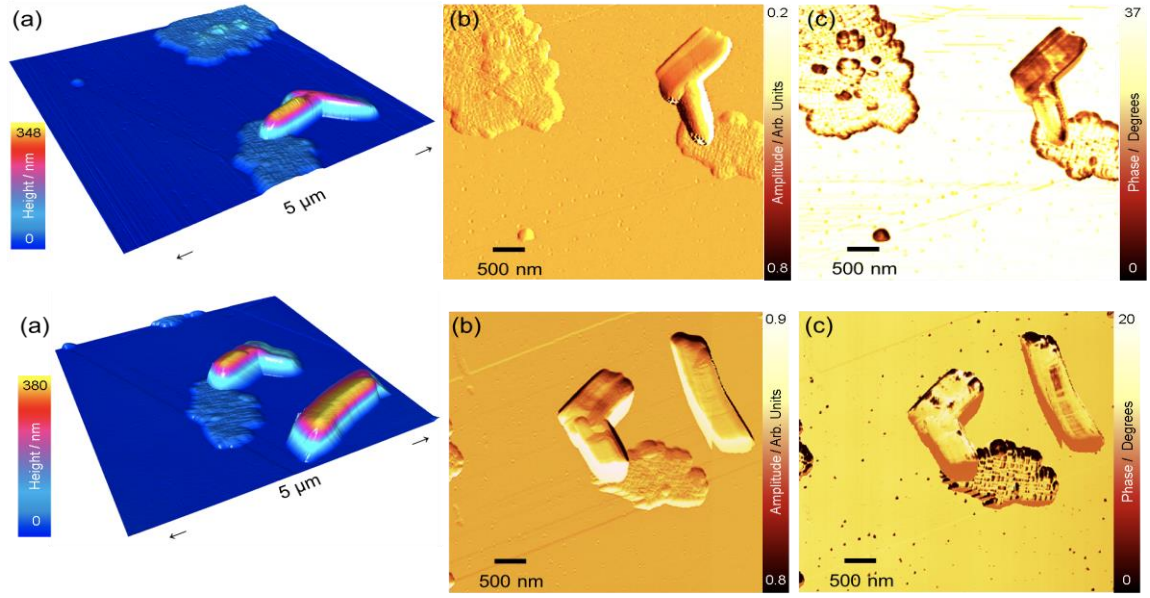

Figure 1 - Dielectric force microscopy images of the gold nanorods deposited on HOPG before and after laser illumination: (a) topography, (b) amplitude, (c) phase.

To investigate crystallinity changes gold nanorods were deposited on highly ordered pyrolytic graphite (HOPG) and illuminated with 405 nm laser. Figure 1 shows DFM images before and after laser illumination. This research will also allow to answer the question - what is the best crystallinity to optimize SERS signal and simultaneously increase photothermal heating.

References

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