Comparative studies of protein functionalized Gold Nanoparticles by Atomic Force Microscopy (AFM) and Transmission electron microscopy (TEM)

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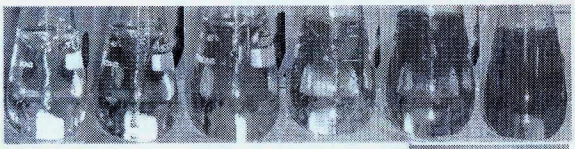
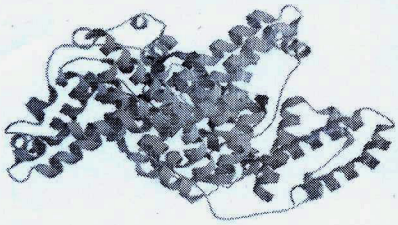
INTRODUCTION

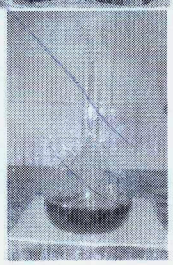
For centuries Gold nanoparticles (GNPs) have found various applications spanning from arts to medicine. Nowadays science allows the morphological, physical, and chemical properties of GNPs to be easily determined. The first use of the GNPs as immunocytochemical markers in transmission electron microscopy was first reported more than 40 years ago. Since then the GNPs have been functionalized by many biological probes such as proteins, nucleic acids, lectins, glycans etc. The recent advancement of nanotechnology promoted the GNP-based assays for sensing enzyme activity in biological analytes (i.e., detection of enzyme-specific chemical reactions in biological environments. Here we present a method for functionalization of GNPs with proteins (bovine serum albumi) and obtaining of nanoparticles films by Langmuir – Blodgett (LB) technique. Both the morphology of the nanoparticles and the morphology of the LB films were further characterized by TEM and AFM . We also demonstrate a simple procedure for detecting enzyme activity of certain proteases. This method can be further refined for biosensor applications.

Evolution of GNPs color during the Turkevich synthesis.

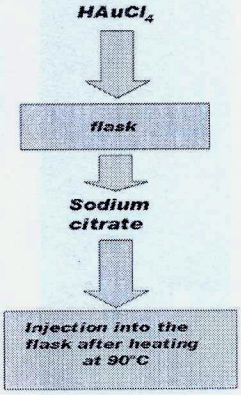
GNPs functionalysed with Bovine serum albumin (BSA).



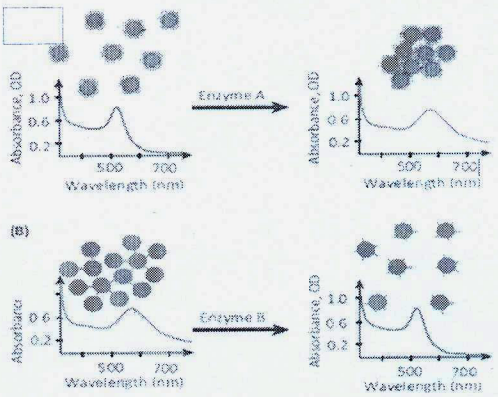




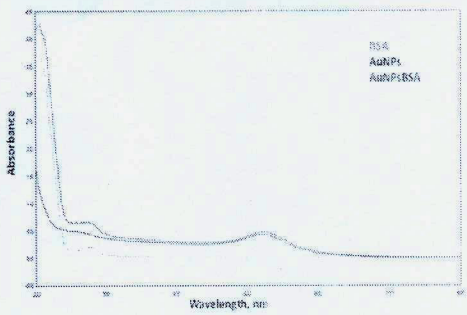
Turkevich synthesis.



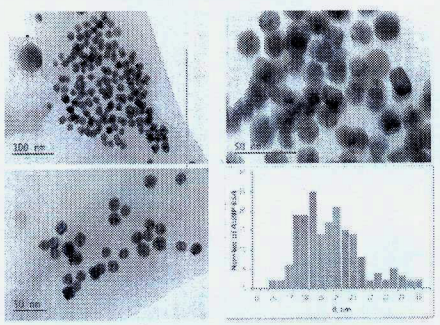
Principles of colorimetric detection of gold nanoparticles enzyme sensor.



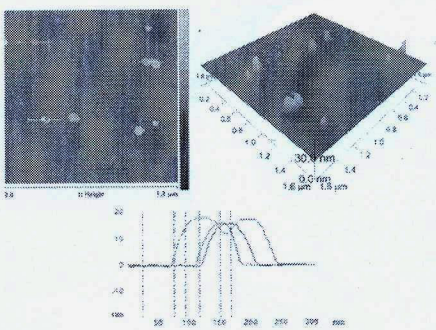
Protein modification of GNPs ,AFM and TEM images of GNPs/BSA.



UV-VIS images of BSA,GNPs and GNPs/BSA

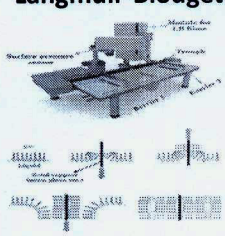


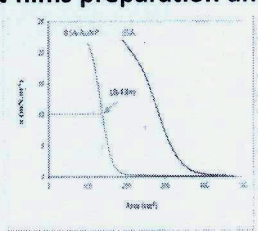
TEM images and size distribution of GNPa/BSA

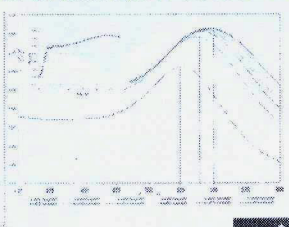


AFM images of GNPs/BSA

Langmuir-Blodgett films preparation and colorimetric detection of Savinase by GNPs modified by BSA







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CONCLUSIONS

We have synthesised GNPs by Turkevich method and functionalyzed with BSA.UV-VIS ,TEM and AFM was used to characterized their shape ,size and SPR properties .LB film were prepared u and they were used as a enzyme sensors.

ACKNOWLEDGEMENTS

Project BG051PO001-3.3.06-0040
"Establishment of interdisciplinary teams of young scientists in the field of fundamental and applied research relevant to medical practice"
The project is implemented with financial support of the operation program "Human Resources Development" financed by the European Social Fund of the European Union

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EUROPEAN SOCIAL FUND