

Ultrasensitive Electrical Detection Method of Proteins by Scanning Tunneling Microscopy

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A novel ultrasensitive detection method of proteins by scanning tunneling microscopy (STM) was developed. The detection method is based on the change of tunneling current at gold (Au) nanoparticles dispersed on the surface of Au substrate insulated with organic/bio material. As a result, the frequency of current peaks was generated in accordance with the surface density of the dispersed Au nanoparticle on the surface, which was represented as periodogram with its logarithmic regression curve. And, the change of the power spectrum was observed in accordance with the concentration of PSA molecule. The lowest detection limit of the assay system for PSA is 10fg/mL. It exhibits a sensitivity that is four orders of magnitude more sensitive than conventional ELISA detection methods for PSA. The proposed detection method could be used to many applications, including medical diagnostics, pharmaceutical development, forensics, and proteomics research.

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