Biomolecular Imaging with Atomic Force Microscope-Mediated Raman Spectroscopy

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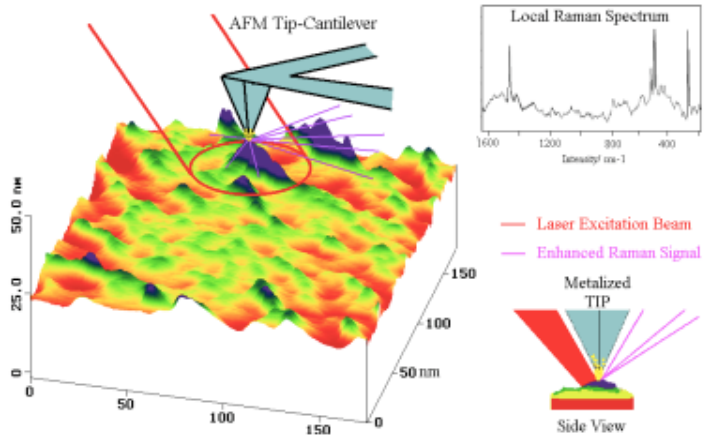

Description

➢Combines the spatial resolution of AFM with the chemical analytical power of Raman spectroscopy to study DNA-protein interactions. May prove very valuable for the study of biological systems.

➢SERS can potentially give very large signal enhancements; factors of 10^{8}-10^{14} have been reported.

Innovative Claims/NASA Significance

➢Extends the use of a Raman-Atomic Force Microscope (Raman-AFM), which was developed at JPL, to the study biological systems and provides unique capabilities (topography and spectroscopy) not available in current instrumentation.

➢This instrument will not only impact NASA missions but will have a tremendous impact in the materials and biological fields.

➢Proposed technique is very clever: using an AFM tip as a substrate for local surface-enhanced Raman spectroscopy (SERS).

Plans

➢Use the Raman-AFM to provide chemical analysis of biological macromolecules at very high spatial resolution

➢Raman-AFM will be applied to macromolecular (DNA-protein) interactions and sequencing.

➢The potential for the Raman-AFM to provide targeted small-molecule spectroscopy and spectroscopy of functional groups on macromolecules will be evaluated.