Coupling optical techniques with scanning tunneling microscopy to investigate organic films

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Scanning tunneling microscopy (STM) is a very powerful technique to investigate organic film surfaces at the molecular and atomic level. Luminescent organic molecules often exhibit self-assembly or supramolecular organization when deposited over a regular or crystalline surface [1]. We investigate here optical processes involved in electronic tunneling, such as innelastic tunneling induced luminescence. Previous studies have shown that inelastic tunneling can take place on such systems with simultaneous emission of light. Metallic nanoparticles could, in principle, enhance the luminescence of these molecules through surface plasmon coupling with the electromagnetic radiation [2]. Our investigation apparatus consists of a spectrometer and an in-air STM microscope. The entrance slit of the spectrometer is aligned with the tunneling probe (Pt-Ir wire tip) under different illumination conditions. A small home-made physical vapour deposition (PVD) chamber is used to evaporate the organic molecules towards a heated substrate. The quality of the film is characterized by X-ray diffraction techniques. We show an investigation of evaporated molecular films through optical techniques coupled with STM.

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