THE ADSORPTION BEHAVIOR OF PYRIDINE CARBOXYLIC ACIDS ON SILVER-COATED ITO BY SURFACE ENHANCED RAMAN SCATTERING

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Keywords: *indium tin oxide(ITO);SERS; Pyridine Carboxylic Acids; adsorption behavior*

Abstract: Ag nanoparticals organized on indium tin oxide (ITO) surface as a new kind of Surface Enhanced Raman Scattering (SERS) active substrate,has a great advantage compared with the traditional SERS active substrate. On this substrate The SERS spectra of Pyridine Carboxylic Acids adsorbed on the ITO coated with silver nano-particles were studied , indicating that this substrate is a highly SERS-active substrate which has promising potentiality of being a new technique for further application on the aera of thin film research

Surface-enhanced Raman Scattering(SERS)[1],using silver, gold, or other noble metals as substrate, compared with the traditional Raman technique, is a powerful *in-situ* technique for studing the film's property and the mechanism of interaction of the molecules with the suface of the substrate[2,3,4],Ag nanoparticals organized on indium tin oxide(ITO) surface can act as a new kind of SERS active substrate as well as a dry potential. Compared with the traditional SERS active substrate, its main strongpoint is that : when the investagation of the film's electricity and other macroscopical characteristic is taken place ,the SERS spectrum can show the microcosmic changes of the film as well. In this report, first, the molecules were dissolved in water, then mixed with Ag hydrosols, after that the mixture was dropped on clean ITO to form a coating solid film. The high quality SERS spectra indicate that the ITO coated with silver nano-particles is a highly SERS-active substrate which has promising potentiality of being a new technique for further application on the aera of thin film research .

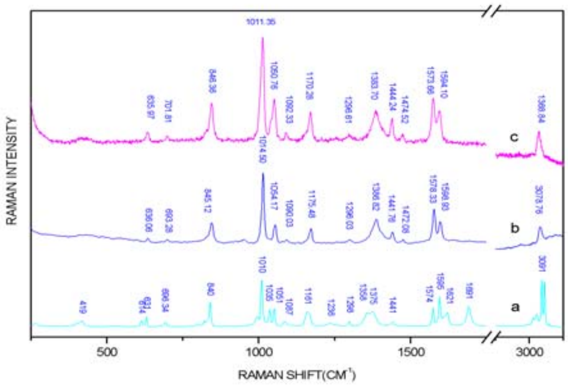

Fig 1 Raman spectrum of solid picolinic acid (a) and FT-SERS spectrum of picolinic acid in silver colloidal (b) and on silver coated ITO(c)

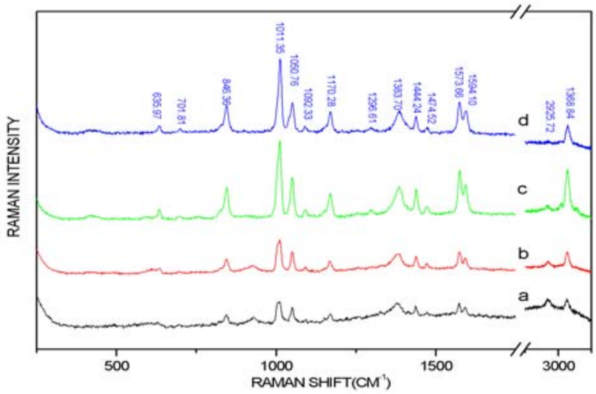

Fig 2,0.001m/l(a),0.005m/l(b) ,0.01m/l(c) and 0.02 m/l picolinic acid mixed with Ag hydrosols ,then droped onto ITO for 4 layers.

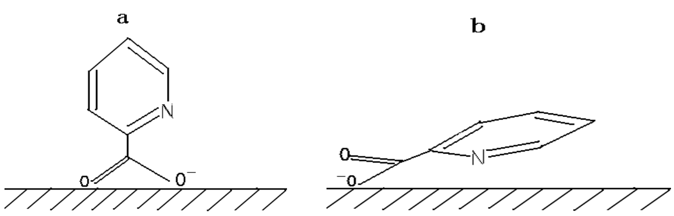

Fig 3 The orientation of picolinic acid in silver colloidal and on silver coated ITO (a) ,and at the low molecule concentration(b)

The Raman spectrum of solid picolinic acid (a) and FT-SERS spectrum of picolinic acid in silver colloidal (b) and on silver coated ITO (c) was shown in Fig 1. From the comparation between (b) and (c) in Fig 1.we can see the difference between the two spectra are small. But in Fig2, there were some significant changes as well as frequencies and intensities , ariseing from the adsorption behavior changes with the proportion of molecules and silver nanoparticles. ,it can be assumed that the molecule's adsorption behavior may like the Fig 2(a) in the silver aqueous colloids and on the silver-coated ITO but when the number of siliver particals are much higher than the picolinic acid molecules ,the orientation of the molecules may like fig 3(b) shows. The probable reason are given .All Raman bands and assignments are according to the referrence[6,7,].to further prove the conclusion,we also discuss the spectra of isonicotinic acid (fig4,5)and nicotinic acid(fig6,7).

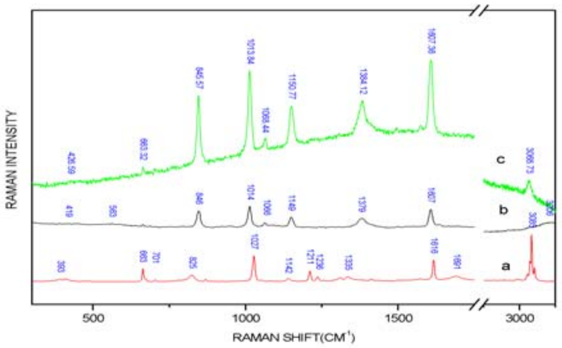

Fig 4 Raman spectrum of solid isonicotinic acid (a) and FT-SERS spectrum of isonicotinic acid in silver colloidal (b) and on silver coated ITO(c)

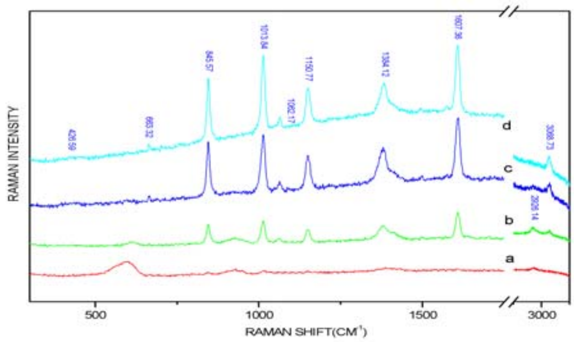

Fig 5 0.001m/l(a),0.005m/l(b) ,0.01m/l(c) and 0.02 m/l isonicotinic acid mixed with Ag hydrosols ,then droped onto ITOfor 4 layers.

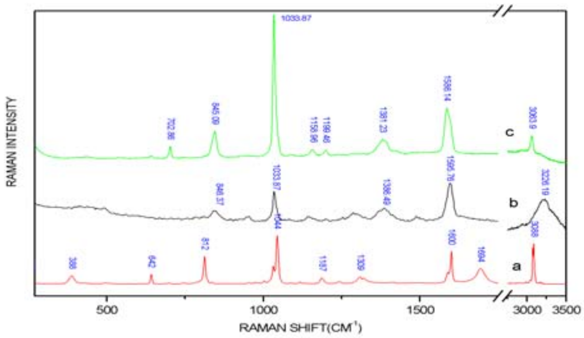

Fig 6 Raman spectrum of solid nicotinic acid (a) and FT-SERS spectrum of nicotinic acid in silver colloidal (b) and on silver coated ITO(c)

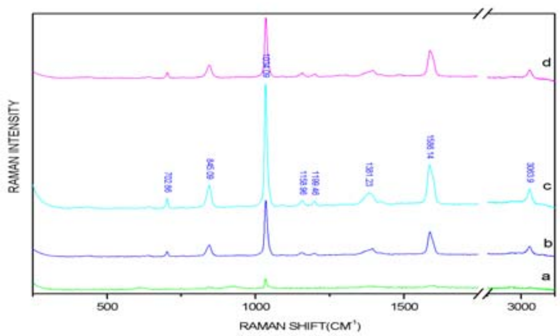

Fig 7 0.001m/l(a),0.005m/l(b) ,0.01m/l(c) and 0.02 m/l nicotinic acid mixed with Ag hydrosols ,then droped onto ITO for 4 layers.

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