

Analysis of Hair Sprays on an Individual Hair



Figure 1. The VideoMVP™ Single Reflection Diamond ATR Accessory.

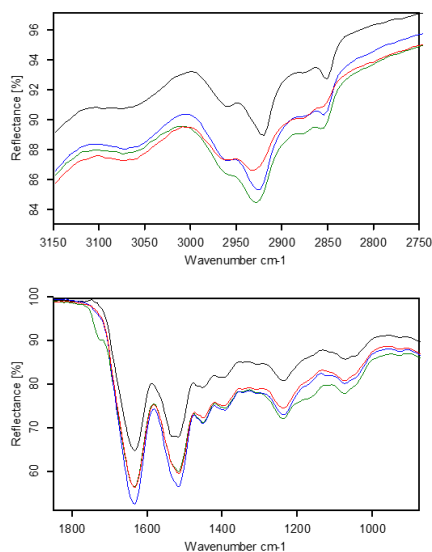


Figure 2. ATR Spectra of Uncoated Hair (black) and Hair Coated with Hairspray: Pure Shine (blue), Salon Selectives (green) and Aussie Hair Insurance (red).

INTRODUCTION

Investigations of individual hairs are used for forensics and have potential for early disease detection. In forensics, hairs are used to connect a victim or suspect to a crime scene and to determine illicit drug use. Hair also appears to exhibit changes due to disease. Some cancers have been shown to chemically alter hair during the growth process.

Identification of surface contamination or coatings on fibers could provide further forensic evidence. To demonstrate the potential for using FTIR-ATR to detect coatings on individual fibers, the VideoMVP™ was used to examine individual hairs treated with various hair sprays.

EXPERIMENTAL

Spectra were obtained on a FTIR spectrometer equipped with a DTGS detector using the VideoMVP™ single reflection diamond ATR (see Figure 1). All spectra were collected from 4000 to 400 cm^{-1} using 32 scans at a resolution of 8 cm^{-1} .

The hairs were treated with one of three hair sprays and were allowed to dry thoroughly prior to analysis. All the hairs used were collected from the same individual. The hair was placed across the ATR crystal on the VideoMVP™ and pressure was applied to compress the hair against the ATR crystal. Sufficient pressure was applied to wet the ATR crystal, as viewed on the LCD display.

Three different hair sprays were examined: Pure Shine Hairspray, Salon Selectives Hairspray and Aussie Hair Insurance Hairspray.

RESULTS AND DISCUSSION

Figure 2 shows the recorded spectra with expanded views of the hydrocarbon stretching frequencies and the fingerprint region. The spectra show a distinct shoulder at 1725 cm^{-1} in the Salon Selectives hairspray which is not apparent in either the untreated hair or in the other hairsprays. This indicates that the carbonyl functional group is in higher concentrations in Salon Selectives than in the other hairsprays. In addition, there are changes in the band structure in the 2800-3000 cm^{-1} region, indicating the three hairsprays tested are likely to have hydrocarbon groups that differ from the untreated hair or that treatment with hairspray chemically alters the hair.

These results demonstrate that single reflection diamond ATR measurements can detect hairspray on a single hair or changes induced by their application.