

Assessing UV Damage of Hair with Fluorescence

Introduction

The results of UV exposure of human hair can be quantified with fluorescence spectroscopy. This is of significant interest to cosmetics and pharmaceutical companies that manufacture hair creams, coloring, shampoos, and conditioners.

Experiment and Results

For customers involved in hair-care products, we performed the following evaluation using fluorescence spectroscopy. Two particular parameters were addressed in selecting the proper instrument for this study:

- Data had to be taken quickly, both to process a large number of samples, and encourage the possibility of taking data from human subjects who may not be able to sit still for long periods of time.
- To allow for live subjects, some remote means of investigation had to be employed.

For these reasons, a SPEX® FLUOROMAX® spectrofluorometer was chosen. Not only is this instrument capable of scanning as fast as 200 nm s^{-1} , but it is fully automated, making it a simple instrument for scientists and technicians to master. In addition, the FLUOROMAX® can be equipped with a fiber-optic accessory, so that samples too large to fit in a sample compartment may be examined.

Figure 1 shows fluorescence from hair unexposed to UV radiation, along with fluorescence

from hair exposed to UV radiation. The damage to the exposed hair is demonstrated by a significant decrease in fluorescence intensity. From further runs, a calibration curve can be established to determine the degree of damage to hair fibers from various exposure times and intensities of UV radiation from sources such as the sun.

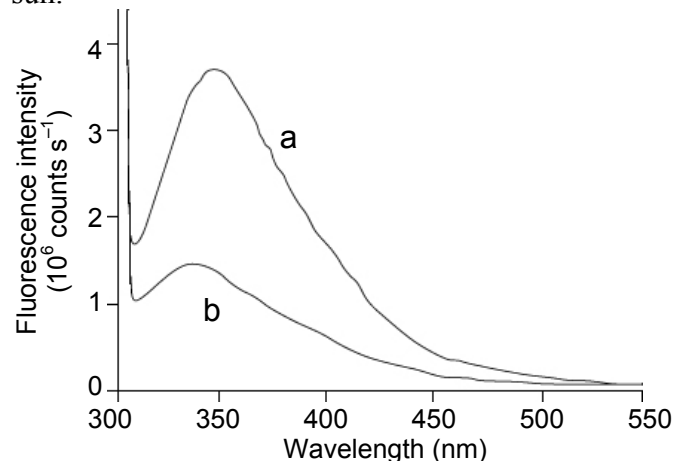


Figure 1. Fluorescence from hair (a) unexposed to UV, and (b) exposed to UV radiation.

Conclusion

The fast scanning, ease of operation, and remote sampling capability of the FLUOROMAX® spectrofluorometer make it a natural choice for quantifying UV damage to hair. The data derived therefrom can be used for the development of treatments to revitalize damaged hair.

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