A154 Optical Characterization of New "Eco-Friendly" Fibers

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After attending this presentation, attendees will have an understanding of the optical properties of the new azlon (protein) fibers, polylactic acid fibers, and others that are touted as being ecologically friendly.

This presentation will impact the forensic community by alerting analysts to these new fibers which are becoming increasingly popular to the environmentally conscious public.

With the recent focus on environmentally friendly products, manufacturers have begun producing fibers to meet the growing demand of an increasingly earth-conscious public. These fibers include azlon (regenerated protein) fibers, polylactic acid fibers, and bamboo rayon. Because these fibers are made from naturally occurring polymers of corn, milk, soybeans, bamboo, and others, they are touted by manufacturers as biodegradable and "eco-friendly", and an alternative to petroleum-based fibers such as polyester. As they become more popular, these fibers will begin turning up in forensic casework. It is important that forensic scientists are aware of these new fibers and are able to recognize them when they are encountered.

While azlon fibers experienced a boom in the 1940s and 1950s, they were discontinued in the United States during the 1960s. However, azlon production is reemerging in other parts of the world and is available to consumers in the form of yarns and textiles. Optical characterization in the literature is sparse, and older data does not seem to be accurate in relation to today's azlons. Azlon can be produced from proteins in corn, milk, and soybeans. The optical characteristics can vary depending on the raw materials or method of manufacture.

Polylactic acid (PLA) fibers are produced by polymerizing dextrose from starch, usually corn starch. This fiber is currently being mass- produced by manufacturers in the U.S. and Japan, and is used both in textiles and in medical applications such as sutures. PLA fibers have caught the attention of the forensic science community, and several papers have been published on their optical qualities.

Because of the extremely fast growth rate of bamboo, it is considered a renewable resource, and is currently used in a variety of consumer products including furniture and flooring. The bamboo rayon fiber is produced in much the same way as viscose rayon, and is optically similar. An attempt has been made by one company to differentiate bamboo rayon from viscose, and this method will be examined here.

This presentation will show polarized light observations, including refractive index and birefringence, as well as hotstage melting temperature. The characterization also includes FTIR spectra, cross-sectional shapes, and solubility determinations. Identifying characteristics of the fibers, as well as a method of distinguishing them from the more common fiber types will be presented.

Fibers, Azlon, Polylactic Acid

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