

ANALYSIS OF TEXTILE FIBERS USING FT-IR SPECTROSCOPY AND CHEMOMETRIC METHODS

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Textiles are flexible woven materials, chemically complex polymeric materials. Besides traditional natural fibres like wool, silk, linen, cotton, there are also numerous of artificial (viscose, lyocell) and synthetic (polyester, polyamide) fibres. Due to their abundance and many similar properties, identification of fibres with traditional methods like microscopy, dissolving and burning can be impossible. In this field less-destructive, easy and quick identification methods must be used. Identification of textile fibres is essential in conservation and archaeology, but also in industry (quality control) and forensic science.

In this study, method development for the analysis of textile fibres was carried out using infrared spectroscopy and chemometric methods. With attenuated total reflectance Fourier transform infrared (ATR-FT-IR) spectroscopy different types (11 single- and 15 two-component) of textiles were measured, the spectra were thoroughly interpreted and classification methods were developed. Discriminant analysis, based on principal component analysis (PCA), was used for classification. [1,2] For the non-destructive measurements, textile fibre analysis with reflectance infrared spectroscopy was tested using Nicolet FT-IR microscope.

Different samples from Estonian National Museum and Conservation and Digitization Centre Kanut were analysed with these developed methods.

References

1. P. Peets, S. Vahur, J. Pelt, I. Leito, *Spectrochimica Acta Part A*, **173** (2017), 175-181.
2. S. Vahur, A. Teearu, P. Peets, S. Vahur, L. Joosu, I. Leito, *Anal Bioanal Chem*, **408** (2016), 3373-3379.

