

## Summary of Scientific Analytical Techniques and their Application

ITCC-IIC (III) Conservation Course 2017

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Research Question	Type of Analysis	Process	Comments
What is the fibre type?	Optical Microscopy	Remove fibres for Polarised light microscopy & Cross section analysis  Check different embedding or mounting media for differences in refractive index  compare with database of reference materials	An alternative approach would be Molecular spectroscopy (FTIR) for general classification (animal, silk, cellulose based) or for analysis of modern polymeric materials  Degraded or processed fibres may lose optical properties which allow their identification
What is the condition of the fibres?	Molecular analysis (non-destructive) and Scanning Electron Microscopy (sample required)	Compare with references of FTIR (ATR) and NIR  Check for spectroscopic markers of degradation, oxidation from scientific literature	It may be possible to correlate condition with NIR spectroscopy and databases of mechanical properties if you have a large sample set  NIR can be very useful for screening collections for material type
What colour is the textile or what is the colour difference between different areas?	Fibre optic reflectance spectroscopy (FORS) (non-destructive)	Compare with database or reference measurements taken previously	Correlate with Colorimetry ( $L^*$ , $a^*$ , $b^*$ values) and $\Delta E$ which is an estimate of colour change  Can convert data to any colour space mathematically
Has there been a colour change ?	FORS (non-destructive)	Compare with data from earlier measurements	N.B. White balance and calibration
Is the material sensitive to light and likely to fade?	Fadeometry (Fibre Optic) (micro-destructive)	Compare dosage in lux to the light levels in your collection	Note that UV component of natural lighting is much more damaging than white light or filtered light

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What dye is present?	UPLC or HPLC which requires destruction of a micro-sample	Careful selection of analytical conditions to optimise separation and detection of components. Compare with database or reference materials	N.B. extraction is the key issue and may need to be selected based on the sensitivity of dyes  Information regarding the mordant may be lost
What metal threads or sequins are present and what are they made of	X-ray fluorescence (XRF) (non-destructive) or Scanning electron microscopy (sample required but not destroyed)	Compare spectra with known emissions from X-ray fluorescence to identify elemental composition of metals or glass	Non-destructive if Environmental SEM is used for analysis.  Health and Safety is critical if using X-ray Spectroscopy