



## Non-Destructive Methods to Investigate the Deterioration Extent of Coptic Egyptian Textiles

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### ABSTRACT

*It is necessary to document the properties of the various components when estimating the condition of a textile and when considering the appropriate conservation treatment. The results for some selected Coptic Egyptian textile objects, collected from different areas in Egypt have been studied by a variety of methods. Fibres were recognised by using either optical (OM) and scanning electron (SEM) microscopes. High performance liquid chromatography (HPLC), ultraviolet/visible (UV/VIS) and Fourier transform infrared FTIR spectrophotometers, were used for identification of dyes. SEM imaging has afforded an assessment of the degradation from changes in the surface morphology of the Coptic samples. The degradation of the textile samples has been detected by both x-ray diffraction analysis (XRD) and infrared spectroscopy (IR). Wool and linen fibers from the Egyptian Coptic textiles have been tested. The analytical results suggest the degradation of the tested samples. It is also clear from XRD, that the crystallinity of total cellulose and crystallite length in Coptic linen samples have been obtained by IR shows a change in the chemistry of degraded Coptic textiles.*

*Keywords: Dyed Egyptian Coptic textiles, Optical Microscope, SEM with EDX, FTIR Spectroscopy, X-ray Diffraction, UV/VIS Spectrophotometer, HPLC*

### 1. Introduction

Material investigation is a necessary step in the documentation of the properties of the component materials of a textile object, in estimating its condition, in considering appropriate conservation treatment (Timmar-Balazsy & Eastop, 1998). The nature of an object exerts a fundamental influence on what can best be done to preserve it, therefore necessary to make a very thorough examination before any decision is made as to the ways and means. The examination of an object as a preliminary to conservation is a process of

familiarization with both the fabric and structure, giving not only the knowledge of what it is and what is made from but also a feeling about the degree of handling it will stand, which is a vital factor in subsequent decision making. The methods of assessing the degree of degradation are perhaps more applicable to the choice of conservation materials than to the state of the objects, as they are all destructive by nature (Landi, 1998).

Egyptian Coptic-textiles are the textiles from A Christian burial in Egypt. Linen and wool fibers are the most