

## **Use of Differential Scanning Calorimetry for the Characterisation and Damage Assessment of Parchment and Vegetable Tanned Leather**

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The employment of the differential scanning calorimetry (DSC) to characterise the collagen matrix and evaluate its integrity in parchment and vegetable tanned leather is presented. DSC, in both excess water and dry conditions, has been used to analyse the thermal denaturation of collagen for a variety of new and artificially aged parchment and vegetable tanned leather as well as historical parchment and leather (micro-sample) from Italian and Romanian archives and museums.

A damage ranking scale based on the large collection of parameters concerning denaturation of collagen in parchment obtained by investigating more than 110 artificially aged samples and 153 historical samples from several European archives and libraries was established. Deconvolution of the DSC thermal denaturation peaks also enabled determination of the stability of parchments with similar damage levels. Further experimental evidences such as melting of the crystalline fraction of collagen, thermal oxidation and gelatinisation were related to specific deterioration patterns.

DSC peaks deconvolution proved to be a viable tool to detect and characterise the heterogeneity of the collagen matrix in vegetable tanned leather, whereas melting of the crystalline fraction of collagen provided clear criteria for distinguishing between original and false leather artefacts.

The aim of this paper is thus to demonstrate that DSC represents a valuable experimental technique for validating new tanning procedures and characterising new collagen based materials for various purposes as well as for assessing damage in historical parchment and leather artefacts.