

Spectroscopic Identification of JunFunori® on Textile and Painting

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Introduction

Extracted from the red algae *Gloiopeltis Furcata* Funori was traditionally used as firming agent in paper consolidation.^[1] Today it is applied for consolidation of matte paints due to its equal light scattering property on smooth and rough surfaces.^[2]

Funori contains a 6-sulfonated agarose. The Sulphur groups prevent the material from gelation at low temperatures and concentrations.^[3,4]

In this study we show how to analyze and identify JunFunori® on consolidated textile and paintings. Analysis is done using the non-destructive methods Infrared Spectroscopy (IR) and X-ray photoelectron spectroscopy (XPS).

Experimental

Bleached Raw Algae, *G. Furcata*
IR, Kjeldahl

JunFunori®
IR, Kjeldahl

JunFunori® Solutions, aq.
UV/Vis (600 nm), Turbidity

1. Identification and comparison of the raw material and the product JunFunori® by IR and Kjeldahl for its protein content.

2. Test of JunFunori® solutions for its turbidity and transparency.

3. Sample preparation Application and analysis of JunFunori® in 0.5 - 10 wt % aqueous solutions on UMB (ultramarine blue) pigment (A & B) and natural canvas (C) by IR and XPS if possible.



JunFunori®

Jun = pure, Fu = sea, No = moss, Ri = fragrance



G. Furcata

Bleached *G. Furcata*

JunFunori®

Gloiopeltis Furcata

Japanese red algae

Results

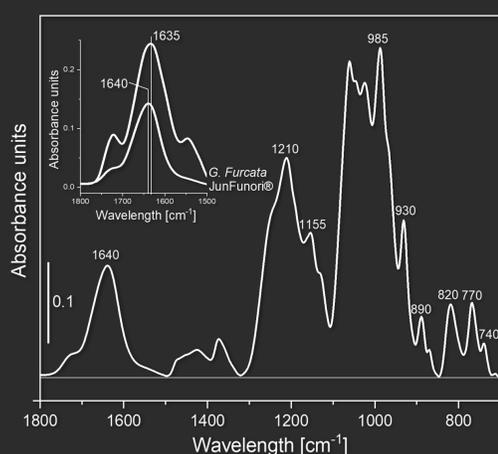


Figure 1: ATR-IR Spectra of JunFunori® in the range of 1800 – 700 cm^{-1} showing the most characteristic absorbance vibrations. The inset compares the spectra of the raw material *G. Furcata* with JunFunori® in the range of 1800 – 1500 cm^{-1} where amide I & II vibrations, characteristic for proteins, absorb.

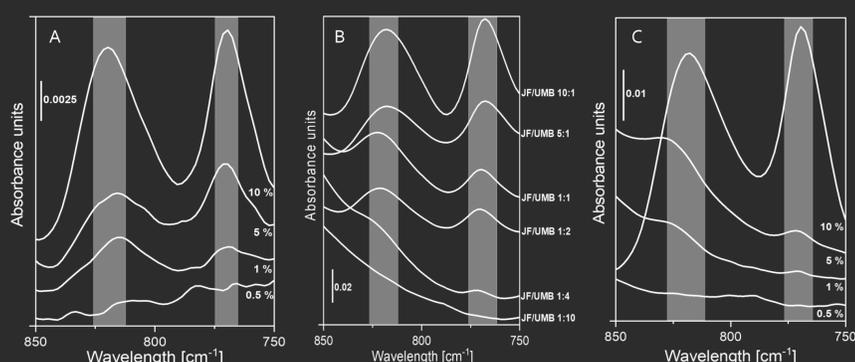


Figure 2: A) ATR-IR spectra of 10, 5, 1 and 0.5 wt. % aqueous JunFunori® solutions applied directly on natural canvas and dried before measurement. B) dried mixtures of UMB and JF (JunFunori®) in various ratios. C) JunFunori® applied from 10, 5, 1 and 0.5 wt. % solutions on UMB on canvas.

Conclusion

1. Comparison of IR Spectra of JunFunori® and *G. Furcata* show a clear reduction of proteins. This is also proven by Kjeldahl analysis, confirming a protein content reduction of 8.9 % to 0.8 %.

2. UV-Vis (600 nm) and turbidity measurements of a 0.5 % aqueous solution resulted in a light transmittance of 87 % and a turbidity of 10.4 FNU.

3. JunFunori®, applied and dried on natural canvas and UMB pigment is unambiguously analyzed and identified using infrared- and X-ray photoelectron spectroscopy.

The findings presented help conservators to distinguish between JunFunori® consolidated and non-consolidated artwork.