

An FTIR survey of contemporary pre-primed artist canvases

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Introduction

Historically, fabric supports for easel paintings have been made from linen or cotton fibres and primed using glue or oil-based layers. More recently synthetic fibres have become available for canvases, and synthetic polymer primers are now commonly used as preparatory layers. Many commercially pre-primed canvases are marketed with a 'universal primer' – intended to be suitable for both water and oil-based paints.

The characteristics of pre-primed canvases are being investigated in a collaborative project by the Queensland Art Gallery | Gallery of Modern Art in Brisbane and the Heritage Conservation Centre, Singapore. The study aims to enhance understanding of potential influences of canvas and priming type on conservation care. This presentation reports initial findings characterising binder and fibre type for 53 samples sourced in Australia and Singapore, including four oil-primed canvases.

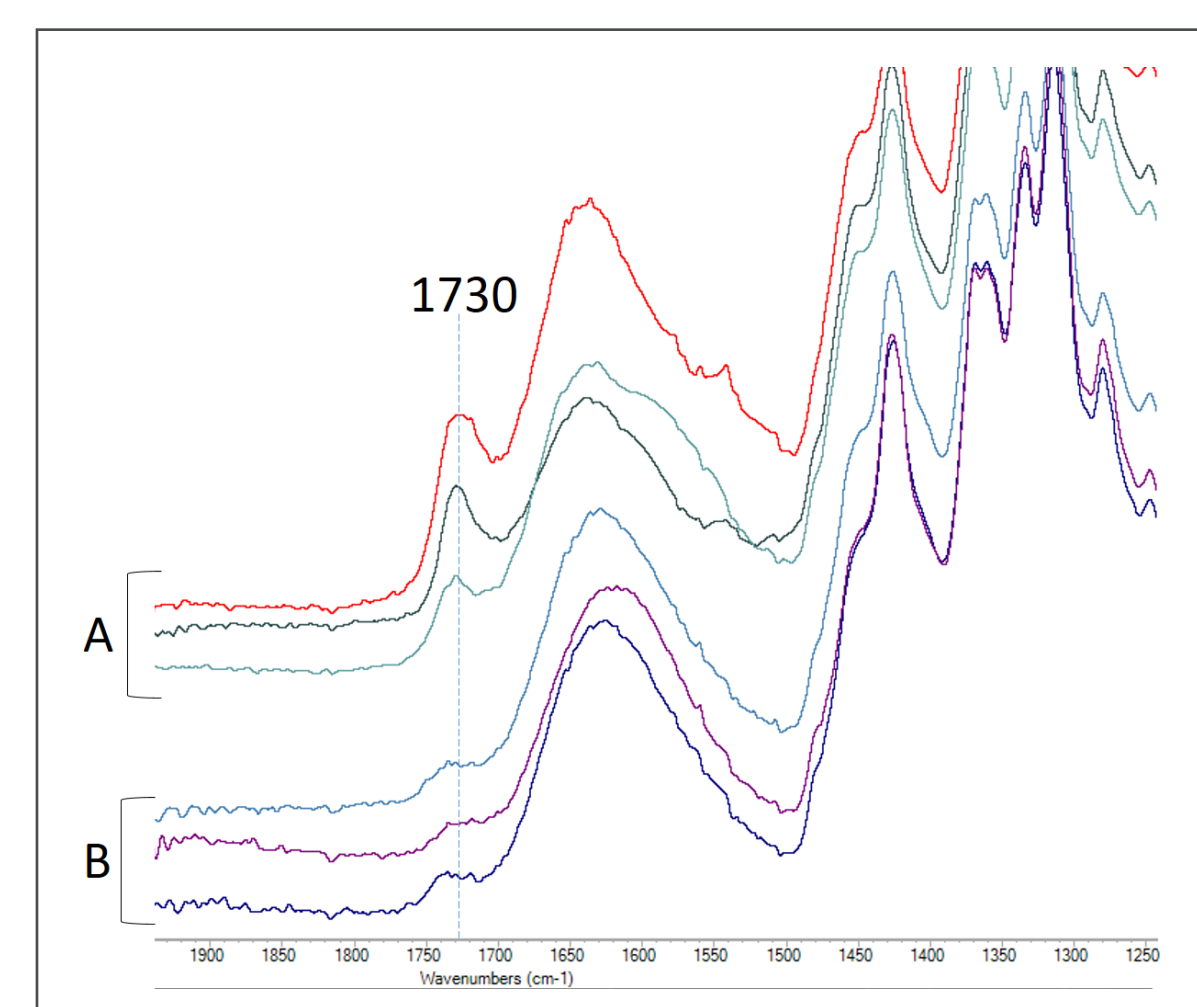


Figure 2. ATR-FTIR spectra comparing carbonyl ester band from linen (A) and cotton (B) canvas samples across a variety of brands.

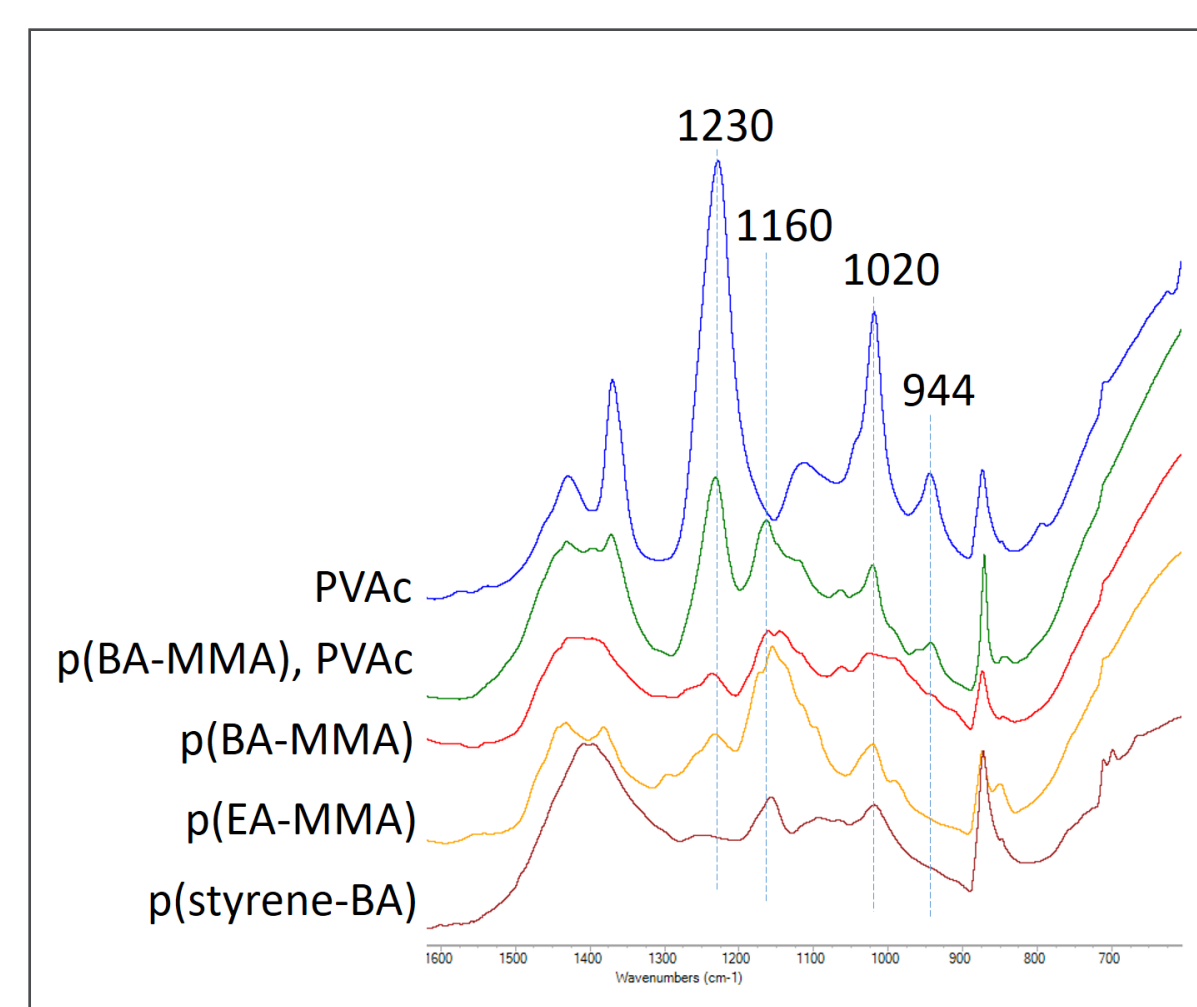


Figure 7. ATR-FTIR fingerprint region for primings highlighting key acrylic/PVAc bands

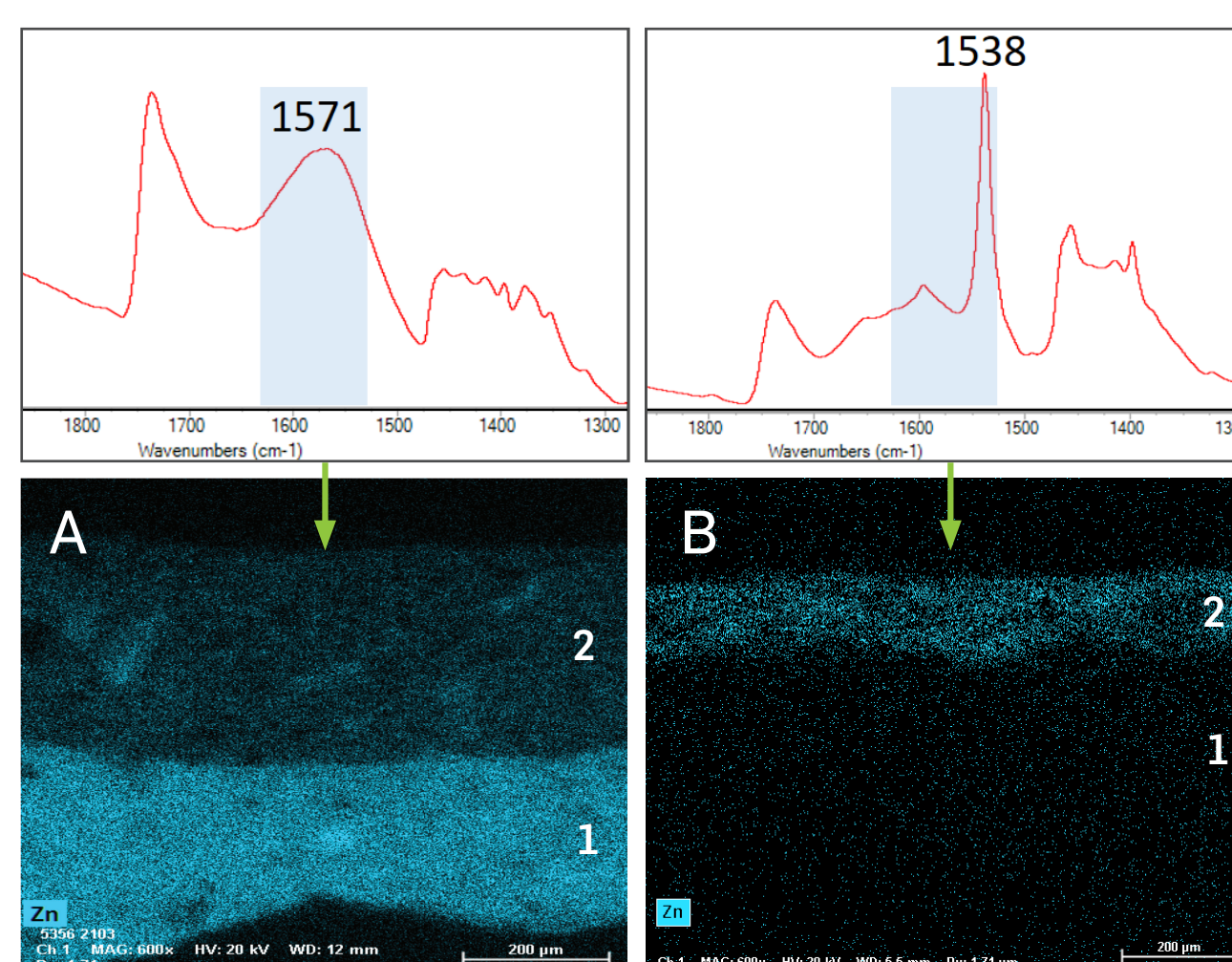


Figure 8. Cross sectional SEM-EDX elemental distribution of zinc and corresponding ATR-FTIR spectra with highlighted metal carboxylate band from surfaces of A. Claessens oil-primed linen; B. Artfix oil-primed linen.

Results: Priming layers

ATR-FTIR analysis of priming allowed characterisation of oil, acrylic, PVAc, and PVAc/acrylic copolymers with and without styrene. Further detail was provided with Py-GC/MS (including the presence of additives – not discussed here). Figures 3 and 4 show comparative data obtained applying the two techniques to the same sample set. The most notable differences relate to the oil-primed canvases and a significantly higher incidence of PVAc detection with Py-GC/MS. The Py-GC/MS results for oil-primed samples (and likely others) incorporate data from lower priming layers of differing composition not captured by the surface-only ATR-FTIR analysis. This reflects the difficulty of physically separating layers of priming when scraping surfaces to obtain sample for Py-GC/MS. The presence of different priming layers within single samples was confirmed by preparation of cross sections (Figures 5 and 6). It is also possible that PVAc detected with Py-GC/MS may be present below the limit of detection of FTIR in some samples, or that acetic acid traces derive from raw supplier or machinery impurities, rather than intentional addition of PVAc.

Acrylic based binders predominate regardless of analytical technique. Py-GC/MS identified numerous combinations of seven acrylic monomers. The most commonly represented copolymers were styrene-BA followed by BA-MMA.

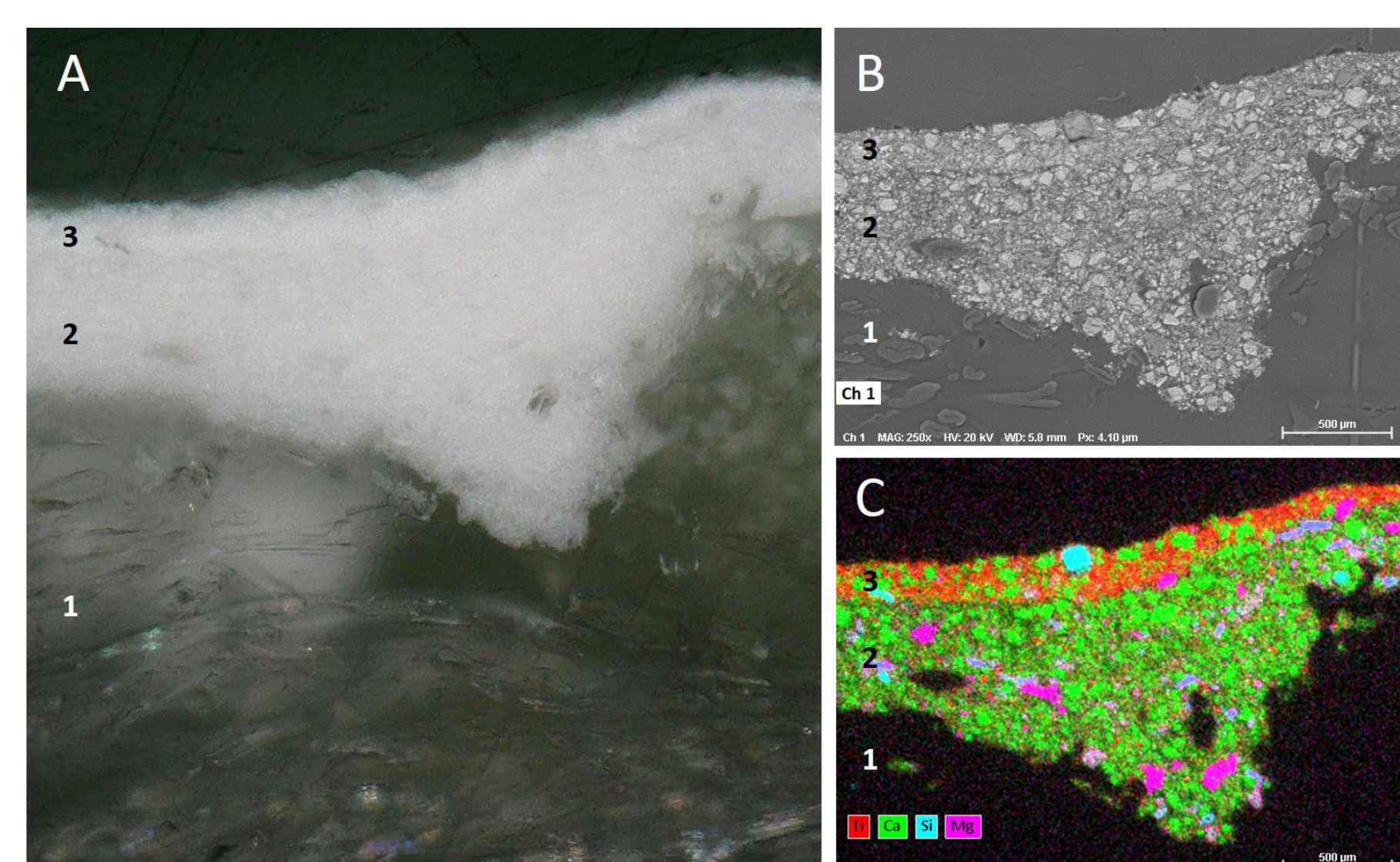


Figure 5. Francheville acrylic primed cotton canvas, p(styrene-butyl acrylate) embedded cross section. A. optical image; B. SEM-EDX elemental distributions of Ti, Ca, Si and Mg; C. SEM backscatter electron image. Layer 1: cotton canvas, Layer 2: chalk, magnesium/silicates (minor), Layer 3: titanium white, chalk (minor). Titanium white is only present in the topmost priming layer

Sample set

The 53 samples include 19 brands of pre-primed canvas produced in China, Australia, India, The Americas and Europe: Artfix, Claessens, Belle Arti, Frederix, Winsor and Newton, Caravaggio, Sydney Canvas Company, Art Spectrum, Clairefontaine, Mont Marte, National Art Materials, Jasart, Overjoyed (OVJ), Pebeo, Semco, Francheville, Phoenix, Talens and Colorpro. Samples were sourced from canvases sold by the metre, supplied stretched, bound in pads or adhered to paper-based boards. All were primed white except for three black samples.

Results: Fibre analysis

Fibre analysis supported by optical microscopy showed good correlation with the information provided by manufacturers. Most canvases (31) were cotton. Linen was used in 17 samples. Polyester (polyethylene terephthalate - PET) was found in 5 samples, including 2 as a cotton blend (Figure 1). The most visible differentiation between spectra of the two cellulosic fibres was the C=O ester band at c. 1730 cm⁻¹ related to pectin content in the sample which is expected to be higher in ramie and flax than cotton (Garside & Wyeth 2003) (Figure 2). Although this simple distinguishing feature appeared a reliable indicator in the current sample group of fresh artists' canvases, it has been observed that this band can be strengthened by the carbonyl groups of oxycelluloses found in degraded materials and so will not necessarily provide consistent data (ibid).

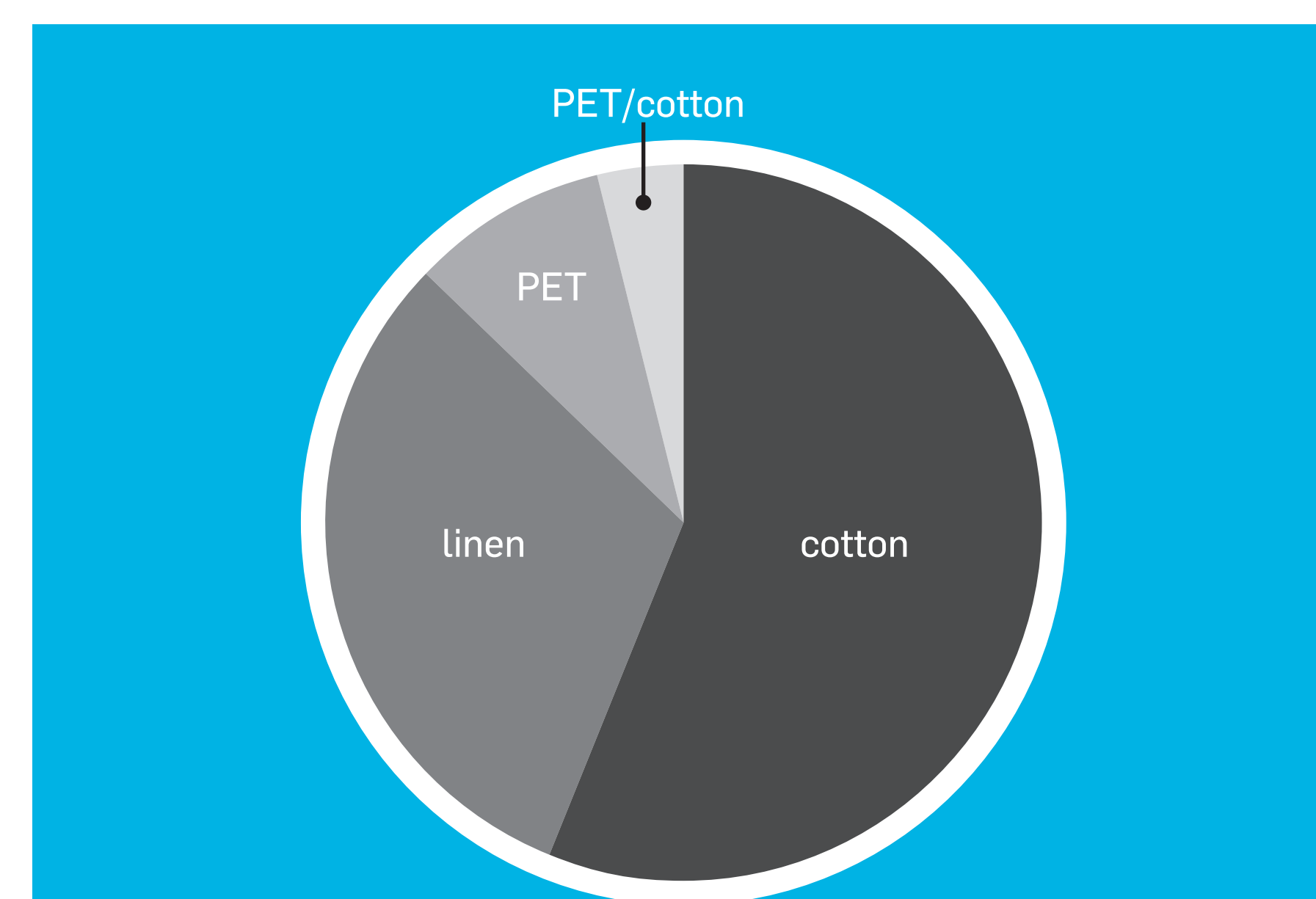


Figure 1. Distribution of canvas samples according to fibre type

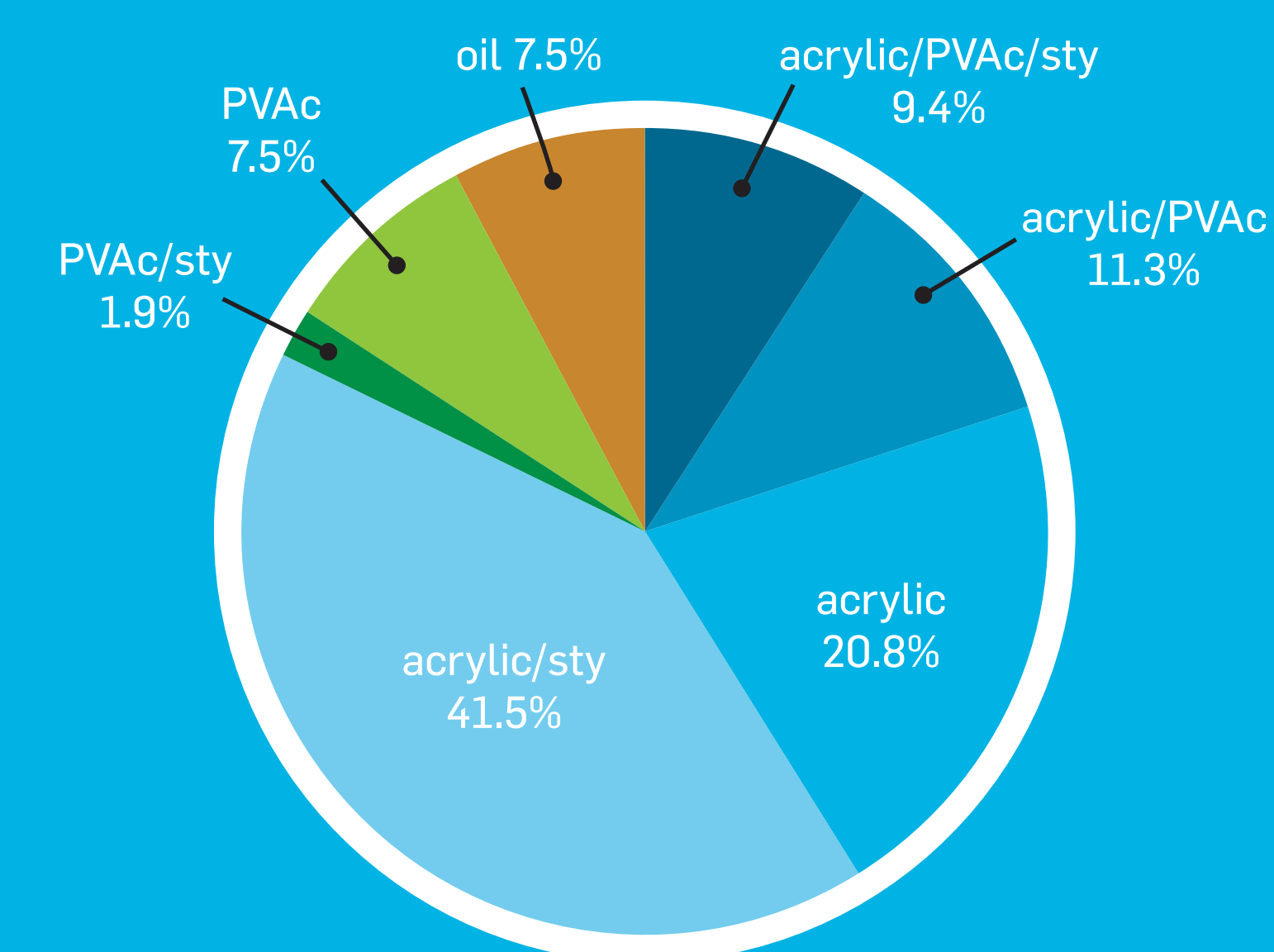


Figure 3. The percentage representation of each binder category as determined by ATR-FTIR

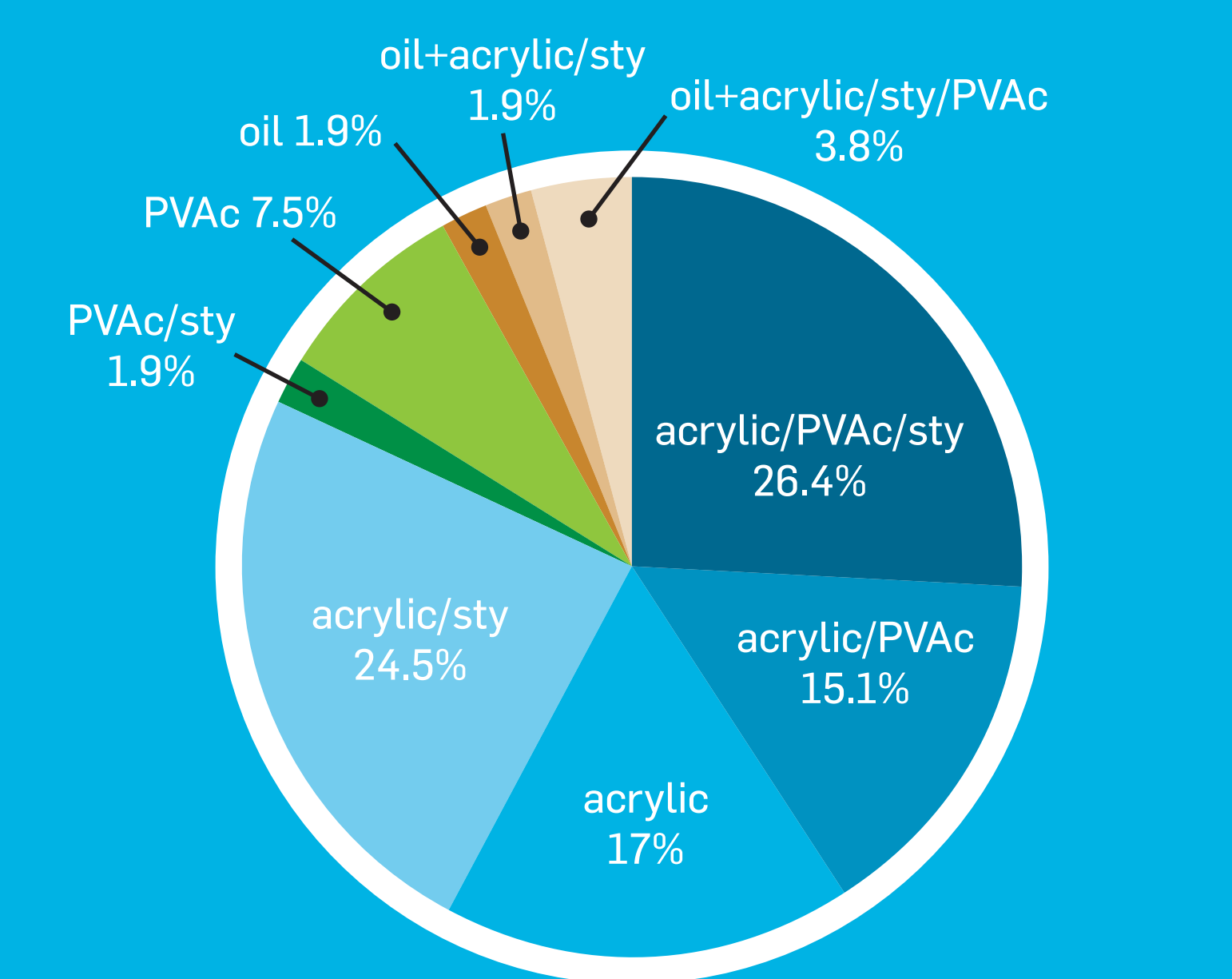


Figure 4. The percentage representation of each binder category as determined by Py-GC/MS. Some results reflect more than one layer of priming

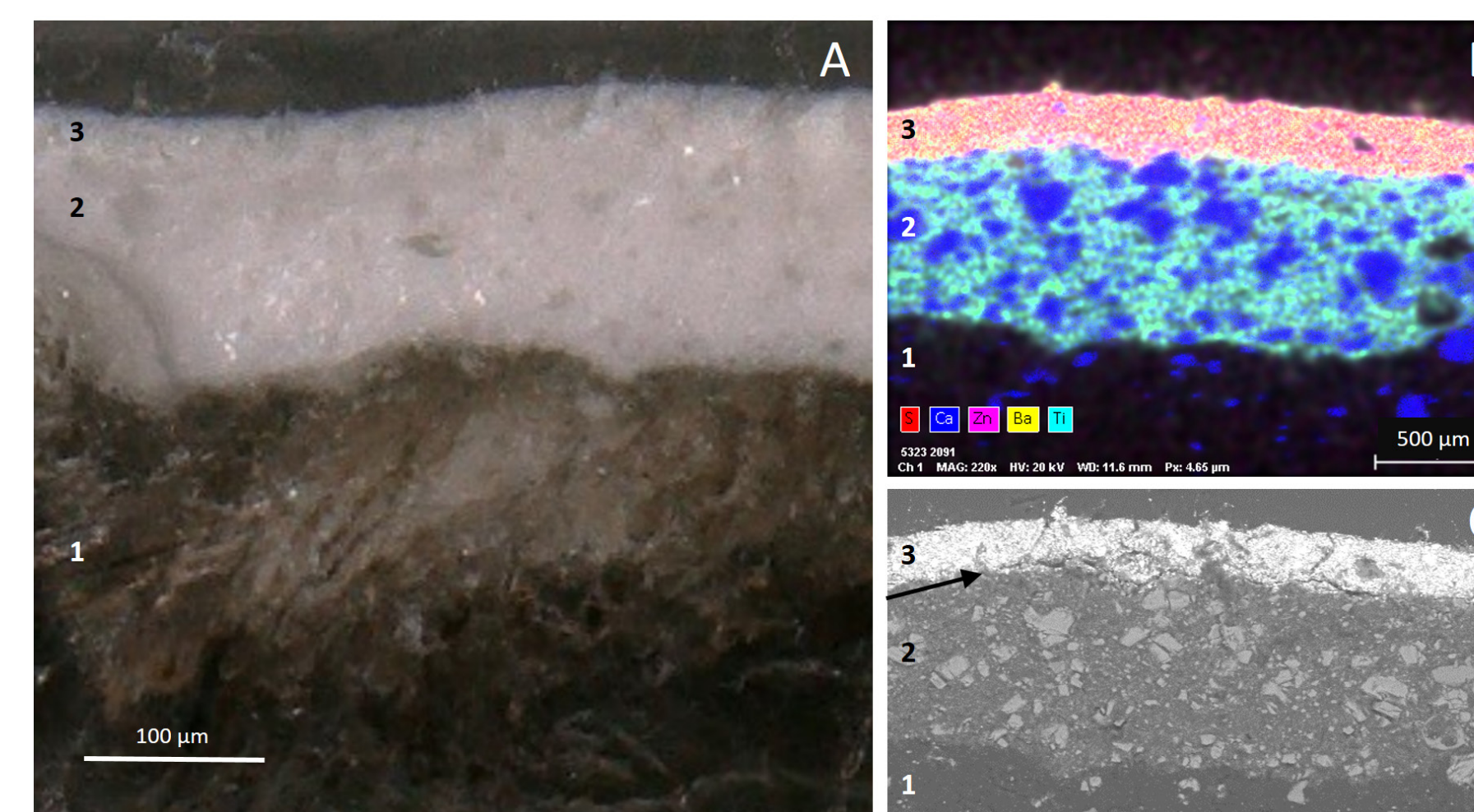


Figure 6. Artfix oil-primed linen canvas embedded cross section. A. optical image; B. SEM-EDX elemental distributions for S, Ca, Zn, Ba and Ti; C. SEM backscatter electron image. Layer 1: linen canvas; Layer 2: chalk, titanium white (acrylic/PVAc/styrene binder); Layer 3: titanium white, barium sulfate, zinc stearate (oil binder). Arrow indicates cracking at interface of layers 2 and 3

Poster presented at IRUG13, Sydney 2018

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