CONSTGLASS

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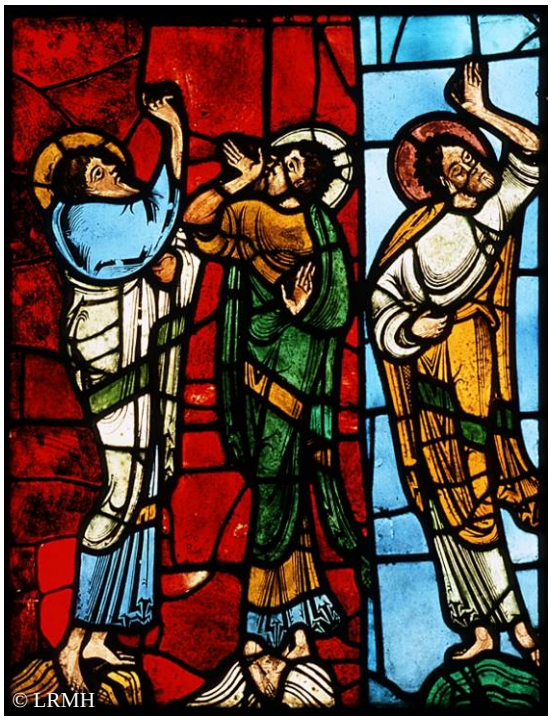
1- Pilot Object

Pilot object:	The *Crowning Virgin and the 12 apostles*, LE MANS **Bay XVI, panel 6**
Picture	 

Identification of the panel:

Bay : XVI
Panel : 6
Internal face, transmitted light
Internal face, reflected light

Treatment:

- **1974**, by Gruber studio.
- Product: polyurethane resin (80% Viacryl® VC363 + 20% Desmodur® N75).
- Application: with a soft brush after cleaning.

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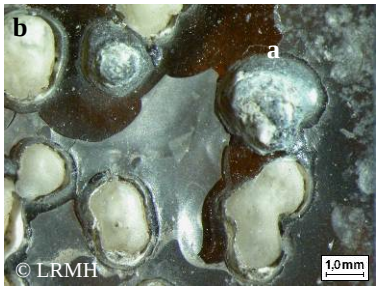
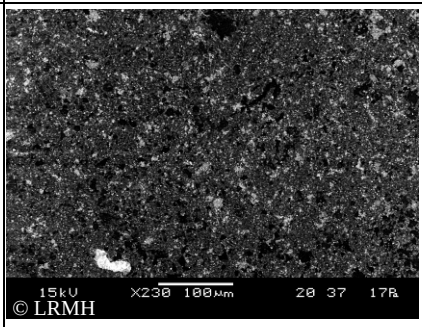
2-Results

Sample reference:	***CHA_bXVIp6_E_v1** : yellow glass, coated with Viacryl® on external surface*

Questions	**Techniques**	**Answers**
Morphology - *What is the morphology of the weathered coating?* - *How is the bonding between coating and glass?* 	**Optical Microscope**	On most of the pieces, Viacryl® has been washed away by rain and wind. Here, a large part is still on the glass, with different states of degradation. On healthy glass, Viacryl® has a good adherence with a development of bubbles (**a**-). On the edges of craters, the coating is cracked and there is a complete loss of adherence on the glass around (**b**-).  a - areas with and without Viacryl®.  b - rests of Viacryl® around craters.
	SEM	 The SEM observations and analyses show that Viacryl® tore off a thin gel layer and a little amount of gypsum.
	Desktop tomography	*Not foreseen in this case*
	Phase-contrast tomography on Synchrotron	*Not foreseen in this case*
Chemical Composition -*What is the chemical composition of the alteration products?*	**SEM/EDX**	Thin gel layer (glass depleted in alkali and alkaline earth metal). Little amount of neo-crystallisations of gypsum.
Organic component composition	**FTIR** **RAMAN**	*Not foreseen in this case, see panel 10*
Microbiology	**Molecular biology, ATP measurements**	*See sample "microbiology tests" at the end of this data sheet.*

Reversibility	**Test studies Elimination**	Tests have been made with water-ethanol poultice during 30 minutes. The rests of coating are soften and then could be removed carefully without taking off the gel layer. Several applications are possible if necessary. The restoration has been made in 2005 by Alliou studio (Le Mans, 72) and Pivet studios (Morthemer, 86), in accordance with the LRMH recommendations.
Re-treatability	**Test studies Re-treatability**	No re-treatability was recommended. An external protective glazing was installed in 2008, by Debitus studio (Tours, 37).

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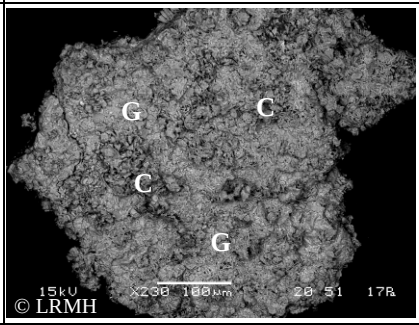
Sample reference:	*CHA_bXVIp6_I_v6 : beige glass, consolidated with Viacryl® on internal surface*

Questions	Techniques	Answers
Morphology - *What is the morphology of the weathered coating?* - *How is the bonding between coating and glass?*	**Optical Microscope**	Most of the grisaille has a good shape on the glass. But on some areas, corrosion products are emerging on the glass and the paint. In most of the cases, this phenomenon does not take off the grisaille from its support. The corrosion products on the glass seem to peel: is it Viacryl® pushed away by alteration?  *Transmitted light*  *Reflected light*  a - corrosion products on glass and paint, proliferating preferentially on glass.  b - detail of the eye: corrosion on the paint without big damage to the paint (no delamination).
	SEM	 Corrosion products have been sampled on the glass. The gel layer (**G**) has been torn off with corrosion products (**C**). On this sample, Viacryl® is not seen.
	Desktop tomography	*Not foreseen in this case*
	Phase-contrast tomography on Synchrotron	*Not foreseen in this case*
Chemical Composition - *What is the chemical composition of the alteration products?*	**SEM/EDX**	The gel layer is a stratum of glass depleted in alkali and alkaline earth metal. The main component of corrosion products is gypsum. It comes from alteration of the glass or alteration of rests of putty.
Organic component composition	**FTIR** **RAMAN**	*Not foreseen in this case, see panel 10*
Microbiology	**Molecular biology, ATP measurements**	*See sample "microbiology tests" at the end of this data sheet.*
Reversibility	**Test studies Elimination**	The restoration has been made in 2005 by Pivet (Morthemer, 86) studio. N-methyl-2-pyrolidone has been used to remove Viacryl® and corrosion products.
Re-treatability	**Test studies Re-treatability**	No re-treatability was recommended. An external protective glazing was installed in 2008, by Debitus studio (Tours, 37).

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Sample reference	*Microbiology tests*

Questions	Techniques	Answers
Microbiology - *Is there a biological contamination?* - *Is there an active infestation?*	**Molecular biology, ATP measurements**	No fungi, no Bacteriae, no biological activity. Microbiological susceptibility has not been tested: no fresh product.

Conclusion: On the external face, it remains not much protective film. SEM investigations show that Viacryl® torn off a part of the gel layer.

On the internal face, the consolidation is still good on most of the paints. Where corrosion products are on the glass paint, they don't seem to have an impact, because in this case they seem to come from alteration of the putty. If they were coming from the glass, it would damage the paint.