



# Comparing Early Twentieth Century Glass Manufacturers Using XRF

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## Introduction

René Lalique (1860-1945) was one of the best-known Art Deco decorative arts glass designers and a leader in the use of new manufacturing technology to create decorative arts objects. Although Lalique was already a well-known glass designer in France and to some extent Western Europe and North America, his success at the 1925 *L'Exposition des Arts Décoratifs et Industriels Modernes* brought a new level of international attention. After the exposition, several glass companies released vases imitating Lalique's style. The most prominent of these companies was the Consolidated Lamp and Glass Company of Pennsylvania, USA.

The Consolidated Lamp and Glass Company released a *Love Birds* vase in 1926 that was remarkably like Lalique's *Perruches* vase. The *Love Birds* vase, like Lalique's *Perruches* vase, was mold-blown, and later this same mold was used to produce vases by other companies: Phoenix Glass, Sinclair Glass, and Pilgrim Glass. There are also known *Perruches*-inspired vases that were produced in Czechoslovakia.

How can a Lalique *Perruches* vase be differentiated from a Consolidated Glass *Love Birds*, or any other company's vase, and what do materials or manufacturing differences tell us about early twentieth century glass manufacturers in France and the United States? To answer this question an unknown vase, initially attributed to Lalique, was investigated using handheld x-ray fluorescence spectrometry (XRF).



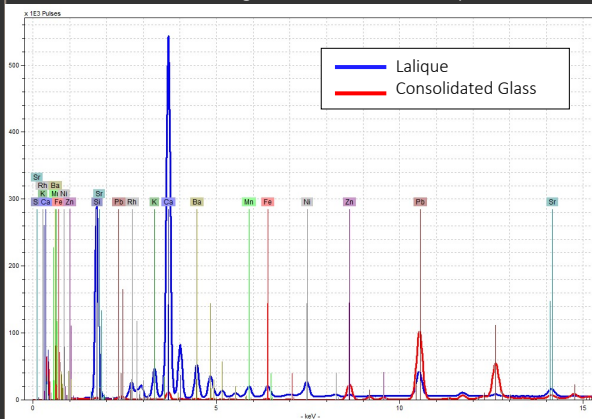
The unknown vase after treatment

## Methods

Glennis Rayermann and Annika Blake-Howland collected high-Z and low-Z XRF spectra from three Lalique and two Consolidated Glass objects in the collection of the Corning Museum of Glass. High and low-Z spectra were also collected for the unknown vase. Spectra were collected using a Bruker Tracer 5i handheld energy dispersive x-ray spectrometer. A 3 mm collimator was used to irradiate the sample. X-ray signals were detected using Peltier cooled XFlash silicon drift detector (SDD) with a resolution of 140 eV. For high-Z collection, the instrument was operated at 50 kV, 35 µA current, a 25 µm titanium:300 µm aluminum filter was used to reduce the background radiation and enhance the sensitivity in the energy range of interest, and spectra were collected over 300 s live time. For low-Z spectra, the instrument was operated at 15 kV and 15 µA current, no filter was used to reduce the background radiation and enhance the sensitivity in the energy range of interest, and the spectra were collected over 300 s live time. Spectra were processed using the Bruker Artax Control software 7.8.

## Results

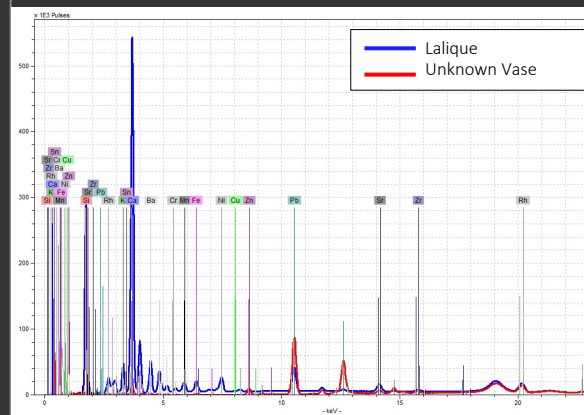
There were clear differences in signal between the Lalique and Consolidated Lamp and Glass Company objects at the Corning Museum of Glass. The major elements detected in the Lalique clear glass were usually silicon and calcium, sometimes with lead, whereas the element with the greatest intensity in Consolidated Glass' clear glass was lead followed by silicon.



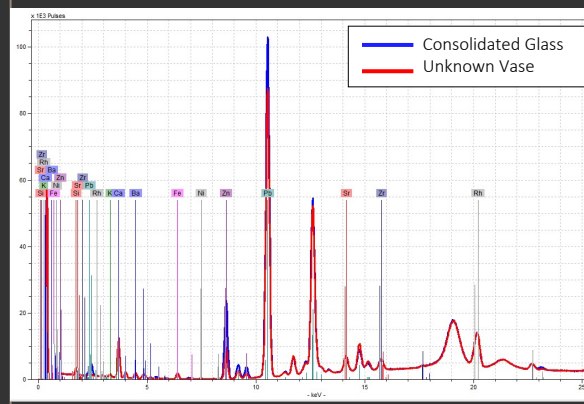
X-Ray Fluorescence spectra (high Z) of clear glass from Consolidated Glass (red) compared to Lalique (blue)

## Results, cont.

When the XRF spectra of the unknown vase and Lalique example were compared, they were dissimilar. The Lalique spectrum had a more significant calcium signal, and the unknown vase had a more significant lead signal. The similarity between the high-Z spectra for the unknown vase and a known Consolidated Lamp and Glass Company object indicates that they may have highly similar compositions.



X-Ray Fluorescence spectra (high Z) of clear glass from Lalique (blue) compared to the unknown vase (red)



X-Ray Fluorescence spectra (high Z) of clear glass from Consolidated Glass (blue) compared to the unknown vase (red)

## Conclusions

By creating reference spectra from known Lalique et Cie and Consolidated Lamp and Glass Company objects, it was possible to determine that the unknown vase is more likely to have been created by Consolidated Glass than Lalique. Additionally, this investigation demonstrates the significant utility of XRF related to the chemical composition of glass. When objects initially appear very similar, XRF can reveal significant differences that may contribute to a greater understanding of an object's manufacturer or manufacturing process.

## References

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Annika with the unknown vase