



M2 Master training (février-juillet 2025)

Laboratoire des solides irradiés (LSI), Ecole polytechnique 91128 Palaiseau

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Glass recycling and decoloration from Roman period: photoluminescence contribution

This internship deals with the Roman glass and in particular we want to finalize a new method that we developed based on photoluminescence, in order to classify the decolored glass. We will mainly work on glass samples coming from Reims and the region.

Nowadays, 87 secondary glass workshops dating from the 1st to 6th centuries AD have been identified throughout the country. Reims is known to have been a major centre of glass production, with five glassmakers' workshops in operation throughout the Roman period, but particularly in the 3rd and 4th centuries AD.

This internship follows on from various projects (Laboratory Research Projects at IP Paris and an M2 internship in 2024) involving the development of a method based on photoluminescence (PL) for sorting colourless Roman glass, in collaboration with INRAP (A. Louis). In Roman times, glass was decolored by adding antimony or manganese, and recycled glass generally contains both elements. We showed that it was possible to use time-resolved PL to sort glasses according to their Sb, Mn or recycled glass decolourisation method quickly and to process a large number of samples using a Python program that we developed. By synthesizing 17 soda-lime glasses, we have also gained a better understanding of which parameters affect the luminescence properties of Sb^{3+} and Mn^{2+} . We hope to go further by carrying out other syntheses, in particular incorporating copper into the glasses. In addition, we will test the impact of glass melting temperature and recycling cycles on the luminescence properties of the glasses. In addition, we have shown that the majority of objects in Reims were recycled, but that a large number of colorless objects had been decolored with antimony in the Reims glassmakers' workshops. We would like to carry out typological studies on glass from Reims and extend the analyses to glass objects from the surrounding area (e.g. Arcis-sur-Aube), which show characteristics similar to those from Reims. We also want to study the question of the export of Reims glass to neighbouring sites. The trainee will therefore carry out various analyses on glass that he or she manufactures and on archaeological glass. Photoluminescence, EPR (Electron Paramagnetic Resonance) and Raman spectroscopy measurements will be carried out at the LSI.

The student should have a pronounced taste for interdisciplinary work.

Methods and techniques: Glass synthesis, photoluminescence, Electron Paramagnetic Resonance, Raman spectroscopy