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Materials, techniques and conservation of historic stained glass "grisailles"

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A grisaille is a brown-blackish paint applied onto the inner surface of stained glass to draw the contours and details of the figures and producethe effect of shades and volumes. Grisailles were traditionally made of finely ground oxides of iron but also of copper, zinc, lead or manganese mixed with a flux such as lead ground glass and a binder and fixed onto the flat glass by firing. The grisailles have typical layer thickness varying between 10 and 100 μm and are formed by a complex mixture of pigment particles, crystalline and amorphous reaction compounds, aging and weathering compounds. The high brilliance, collimation, energy selection and monochromacity of the SR beam are ideal to obtain micro-XRD patterns from thin cross sections of the grisailles. The analyses are complemented with SEM-EDX and LA-ICPMS. A selection of grisailles from several cathedrals and buildings in Spain, Avila, Burgos, Alcalá de Henares and in particular from Segovia, dating from early 16th to the 20th century and belonging to several master glaziers are studied. Changes in the methods of production and materials in the different historical periods are obtained and also related to the conservation state of the materials.

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