Detection of glass particles on bone lesions using SEM-EDS

Human rib bone samples were analyzed using SEM and EDS in order to find and recognize glass particles, which is of importance in forensic cases to identify the wounding agent.

Sample preparation

Different bone samples were prepared for analysis, because of the chamber size the bones were cut into pieces of around 0.5 cm

Data acquisition conditions

Analyses were performed using FEI Quanta 250 FEG equipped with a backscattered electrons and gaseous analytical detector, with an aperture of 500 μm. A 6.0 spot was used in combination with a 20 kV voltage.

Fresh bones and boiled bones were analyzed separately in low vacuum and only boiled bones were analyzed in high vacuum.

Spot mode and full frame mode were used in the EDS analysis, however, composition maps are not shown in the document.

Results

SEM images are not enough to determine if a particle is made of glass or not, once a particle has been identified EDS in necessary in order to confirm its composition, glass particle spectrum identification relies on the presence of Si as a major element and Na, Ca, Mg and Al as minor elements; in the case of mirror particles, titanium was present in the opaque side of the mirror.

Defleshment of bones via boiling caused a loss of information in terms of detected glass particles, author suggest to use low vacuum mode with a fresh bone without defleshment.
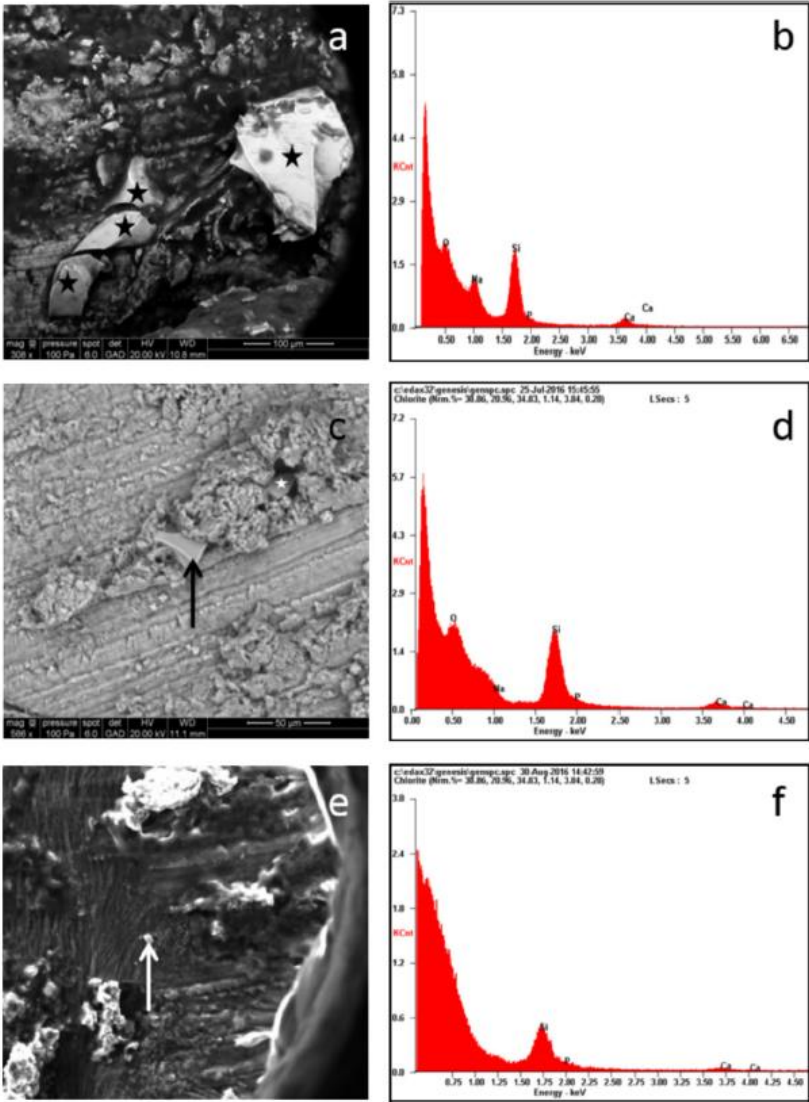
Capture of particles detected as glass (black or white stars, white or black arrows) with associated spectra for the lesions caused by mirror fragments in **a**, **b** low vacuum conditions on fresh bone samples, in **c**, **d** low vacuum conditions on boiled bone samples, and in **e**, **f** high vacuum conditions on boiled bone samples.

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