Application Note 040
Bone Collagen Measurements

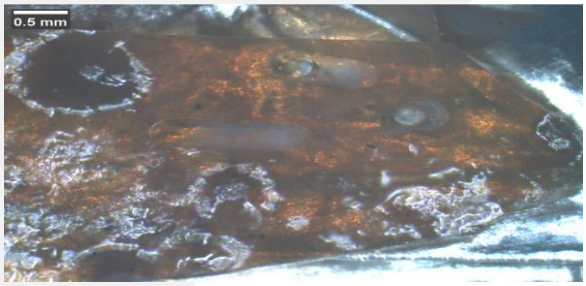
The Sercon CryoFlex : an integrated solution for LA-IRMS

The isotopic signatures of bone collagen are widely used in investigating human and animal diet as well as population mobility. Traditionally the process of bone collagen extraction can be both time consuming and labour intensive. By using a Laser Ablation technique, the process can be refined to exclude weighing of individual samples and reduce running costs whilst allowing the convenience and confidence of repeat measurements, regardless of sample size.

In order to benefit from the advantages of LA-IRMS the traditional EA-IRMS and the innovative LA-IRMS need to show agreement. A previously extracted and measured sample was analysed several times using a Sercon HS2022 IRMS with Cryoflex interface coupled to a Teledyne CETAC LSX-213G2+ laser ablation system equipped with an IsoScell developed by Terra Analitic. The first result, a trial using a single point calibration to assess the technique gave similar results to the value measured via Elemental Analyser. Further tests were performed using IAEA and USGS reference material for calibration and replicate samples were analysed during a further three batches.

The mean corrected value for $\delta^{13}C$ of -21.43 ‰ from the LA-IRMS system gave close agreement to the historic value of -21.1 ‰ measured via EA-IRMS. These values show that LA-IRMS can be successfully used in determining the isotopic signatures of bone collagen whilst reducing the sample preparation workload and lowering the cost of analysis.

The Sercon CryoFlex system is optimized for LA-IRMS performance.



Picture showing the extracted bone collagen as viewed from the LSX-213G2+ on board microscope

	Beam Size (nA)	Corrected $\delta^{13}C$ Collagen ‰	Standard Deviation ‰
Test 1	2.36E-08	-21.17	N/A
Test 2	1.28E-08	-21.26	0.18
Test 3	2.08E-08	-21.52	0.11
Test 4	3.63E-08	-21.57	0.11
All Data		-21.43	0.22

Table showing corrected $\delta^{13}C$ values of bone collagen measured with the Sercon CryoFlex System

Sercon would like to recognize, Dr. Marius Robu at the Romanian Speleological Institute, Elina Sahlstedt, and Katja Rinne-Garmston at LUKE, for their help in producing this application note.