

# Assessing ionisation efficiencies of small Pb loads by thermal ionisation mass spectrometry and investigating the effects of Re dopants on phosphoric-silica gel emitters

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## 1. British Geological Survey



Keyworth Site

- ⇒ World leading geological survey with headquarters in Keyworth, near Nottingham
- ⇒ Provides expert knowledge on all areas of geoscience to industry, academia and the public
- ⇒ Research areas include marine geoscience, groundwater, and earth hazards, among many others

Uses ID-TIMS to undertake U-Pb analysis of zircon minerals

Lab quantifies geological time to increase understanding of the evolution of the earth's system

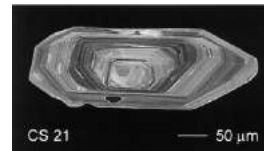
Obtained U-Pb dates are highly precise, granting the lab a strong international reputation in the field

## Geochronology and Tracers Facility

Position: Isotope Studentship

**0.1 %**  
PRECISION

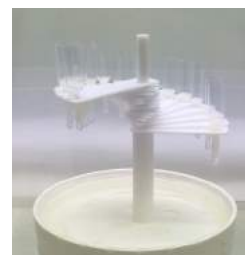
## 2. Roles and Responsibilities



Zircon Grain



Parr Bomb



Large Capacity Columns



Rhenium Filament



Thermal Ionisation Mass Spectrometer

### Zircon Selection

Annealing, Chemical Abrasion, Rinsing

### Addition of Tracer and Dissolution

Chloride Conversion

### Anion Exchange Chromatography

Sample dried down

### Loading onto Rhenium Filaments

Using Colloidal Silica Gel

### Analysis by TIMS

### Routine Tasks

Sample preparation and analysis

Other Responsibilities: managed day-to-day running of zircon lab, trained new members of the team (including new Surrey students) and took a leading role in weekly lab meetings to solve problems encountered

## 3. Project Work

### Aim:

Increasing Pb ionisation efficiency (IE) of zircon samples

*Higher Pb IE = Better Analytical Performance = Greater Measurement Precision*

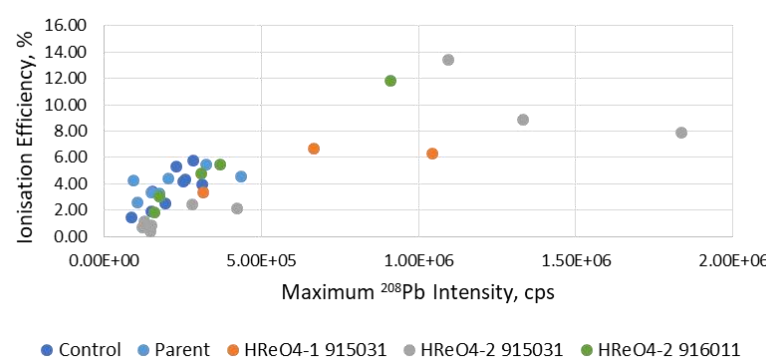
**4.2 %**

Average Pb ionisation efficiency reported in Hyuskens et al., 2012

**? %**

Unknown ionisation efficiency for our standard procedure

Ionisation Efficiencies of Silica Gels



**13.4 %**

Maximum ionisation efficiency achieved through experiments

- ⇒ Proven huge potential in increasing Pb output from samples
- ⇒ If the data can be reproduced reliably, it will improve precision of all lab data

## 4. Achievements

- ⇒ Broke lab record for lowest Pb blank in a set of zircon samples
- ⇒ Became independent in the majority of lab processes at an early stage in the year
- ⇒ Planned and carried out a research project successfully, yielding results with huge potential for future work
- ⇒ Developed personal skills such as problem solving, public speaking and time management. Also developed technical skills in mass spectrometry, chromatography, and analytical interpretation of data



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