2019 TIGeR CONFERENCE
Pathways towards equilibrium in geological systems
11–13 September, 2019
Curtin University, Perth
PROGRAM
Make tomorrow better.
The aim of this 3-day conference is to promote progress at the leading edge of this topic through presentations and open-forum discussion. We will focus on questions related to mechanisms of mineral and rock equilibration from the Earth’s surface to the deep crust, including:

- Crystallization and re-equilibration in aqueous solutions and its consequences
- Re-equilibration in crustal rocks and drivers towards equilibrium: a question of spatial scale?
- Are metamorphic rocks non-equilibrium self-organised systems?
- What mechanisms are available for the re-equilibration of a mineral assemblage?
- What can we learn from mineral microstructures and rock textures?
- Mineralization patterns and ore deposits as non-equilibrium phenomena
- Open and closed systems

The total number of participants will be limited to about 80-100, to facilitate active participation and open discussion. So register early to avoid disappointment.

THE AGENDA
The aim is to have short presentations (20 +10 minutes for keynote speakers, 10 + 5 minutes for other talks) focusing on specific issues for later discussion. Poster sessions throughout the conference will provide further discussion time. The detailed schedule will be sent out after the registration period.

9.00 – 9.30am
REGISTRATION and TEA/COFFEE

9.30 – 9.45
Andrew Putnis
Introduction to the 2019 TIGeR Conference

9.45 – 10.15
Denis Gebauer
Predicting Aqueous Mineral Phase Behaviour based on Non-Classical Nucleation Theory

10.15 – 10.45
Ruiz-Agudo, E., Putnis, C.V., Kudlac, K., Cizer, O., Elert, K., Burgos-Cara, A.
Calcite formation and growth via amorphous calcium carbonate nanoparticles

10.45 – 11.15
Natalya A. Garcia, Alicia Schuitemaker, Emily H. Byrne, Alessandro Silvestri, Marco De La Pierre, Raffaello Demichelis, Paolo Raiteri, Julian D. Gale
Crystallisation of biominerals: What can computation tell us?

11.15 – 11.45
Sylvain Bernard, Damien Daval, Philippe Ackerer, Sylvain Pont, Anders Melibom
Burial-induced oxygen-isotope re-equilibration of fossil foraminifera: experimental evidence and possible impacts on paleotemperature reconstructions

11.45 – 12.15
Matthew S. Fantle, Piyali Chanda, Christopher Gorski, Rosemary Oakes
Experimental investigation of the short-term exchange of foraminiferal calcite: Implications for the nature of diagenetic imprint on the geochemical proxy record

12.15 – 13.15 LUNCH

13.15 – 14.15 DISCUSSION/POSTER SESSION

14.15 – 14.45
Juan Manuel Garcia Ruiz
To be confirmed

14.45 – 15.15
Eric Oelkers
The kinetics of isotope exchange during ambient temperature water-mineral interaction

15.15 – 15.30
Christine V. Putnis, Encarnación Ruiz-Agudo
Dynamic equilibrium during calcite-water interactions

15.30 – 16.00
Aleksy Sadekov, Luke Skinner, Margaux Brandon, Christine Veta Putnis, Malcolm McCulloch
Effect of dynamic equilibrium on REEs geochemistry of deep-sea carbonates and its implication for REEs budget in the oceans

16.00 – 16.30
Silvia Frisia, Mihály Pósfai, Andrea Borsato
Crystallization processes in carbonates archives of climate change

16.30 – 17.00 COFFEE/TEA BREAK

17.00 – 17.15
J. Auffret, C. Gervais, L. Segalen, E. Balan
Dissolution-recrystallisation of bone in natural environments and controlled diagenesis experiments

17.15 – 17.30
N.A. Garcia, R. Demichelis, C.V. Putnis, P. Raiteri, J.D. Gale
Crystallographic Control of Apatite Mineral Dissolution

18.00 BARBEQUE OUTSIDE BUILDING 312 (GEOLOGY)
### THURSDAY 12 SEPTEMBER

<table>
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<th>Time</th>
<th>Session</th>
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SIMS investigations of recrystallisation of and diffusion in carbonate at low and high temperature |
| 9.30 – 10.00  | Thorsten Geisler, Christoph Lenting, Lars Dohmen, Michael Sulzbach  
Real-time, in situ investigations of solid-fluid reactions by fluid-cell Raman spectroscopy |
| 10.00 – 10.30 | Andrew J. Frierdich, Denis Faugerouse, Scarlett C. Southall, Steven M. Reddy, David W. Saxey  
Iron Oxide Recrystallization Mechanisms Captured by Atom Probe Analysis of Isotopic Tracers |
| 10.30 – 11.00 | COFFEE/TEA BREAK                                                                                  |
| 11.00 – 11.30 | Evans, K.A., Powell, R.  
When is an equilibrium thermodynamic approach applicable? |
| 11.30 – 11.45 | Alok Chaudhari, Joel Brugger, Andrew Frierdich, Rahul Ra, Barbara Etschmann, Allan Pring, Paul Guagliardo  
Crystallization and re-equilibration in copper-sulfides – insights from the mineral replacement of chalcopryte by digenite/covellite |
| 11.45 – 12.00 | COFFEE/TEA BREAK                                                                                  |
| 12.00 – 12.15 | Lisa Tannock, Marco Herwegh, Alfons Berger, Klaus Regenauer-Lieb  
Processes and Mechanisms of Giant Quartz Reef Formation. Part 1: Observations |
| 12.15 – 12.30 | Klaus Regenauer-Lieb, Marco Herwegh, Alfons Berger, Lisa Tannock  
Processes and Mechanisms of Giant Quartz Reef Formation. Part 2: Model of the Dynamics |
| 12.30 – 12.30 | LUNCH                                                                                           |
| 13.00 – 14.30 | DISCUSSION/POSTERS/VISIT TO JdL CENTRE                                                          |
| 14.30 – 15.00 | Klaus Mezger, Jonas Pape  
Reprocessing of Chondrules during Early Solar System Evolution |
| 15.00 – 15.30 | Stephanie Kovach, Tracy Rushmer, Sandra Piazolo, Simon Turner  
Different modes and time-lines of alteration in carbonaceous chondrites |
| 15.30 – 16.00 | COFFEE/TEA BREAK                                                                                  |
| 16.00 – 16.15 | Eleanore Blereau, Chris Clark, Pete Kinny, Richard Taylor, Tim Johnson, Eleanor Samson, Martin Hand  
Using rare earth elements in zircon to investigate the thermal history of a UHT terrane |
| 16.15 – 16.30 | Ruairidh J. Mitchell, Tim E. Johnson, Katy Evans, Saibal Gupta, Chris Clark  
Protolith heterogeneity, melt loss and the development of microstructures in granulites |

### FRIDAY 13 SEPTEMBER

<table>
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<tr>
<th>Time</th>
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| 9.30 – 10.00  | Bruce Hobbs, Alison Ord, Stanislav Ulrich, Karel Schulmann  
The influence of metamorphic reactions on localisation of deformation |
| 10.00 – 10.30 | David Doležil  
Physical and chemical dynamics of hydrothermal systems. non-linear interplay of transport, dispersal and reactivity |
| 10.30 – 11.00 | COFFEE/TEA BREAK                                                                                  |
| 11.00 – 11.30 | A. Beinlich, T. John, H. Vrijmoed, M. Taminaga, T. Magna, Y. Podladchikov  
Timescale of mid-crustal fluid-mediated rock re-equilibration |
| 11.30 – 12.00 | Benjamin Malvoisin  
Fate of fluid pathways during reaction in closed system |
| 12.00 – 12.15 | Yuan Mei, Weihua Liu, Joel Brugger  
Probing Metal Transport in the Deep Earth Using Molecular Simulations |
| 12.15 – 12.30 | Margaret S. Boettcher, Pamela Mayer, Jessica Warren, Cécile Prigent, Arjun Kohli  
Integrating Evidence from Peridotite Mylonites and Earthquake Stress Drops to Understand Slip on Oceanic Transform Faults |
| 12.30 – 12.45 | Steffen H. Büttner, Edmore Marima, Geoffrey H. Howarth  
Equilibrium and disequilibrium crystallisation and melt segregation in kimberlitic melt inclusions from Mansebery mine, South Africa |
| 12.45 – 13.40 | LUNCH/DISCUSSION/POSTERS                                                                          |
| 14.00 – 15.00 | M. Godard, S. Escario, S. Peuble, P. Gouze  
Serpentinitization and carbon trapping in peridotite basalts: New insights from reactive percolation experiments |
| 15.00 – 15.30 | Shuyun Cao, Franz Neubauer, Meixia Lu  
Graphitic material in fault zones: Implications for fault strength and carbon |
| 15.30 – 16.00 | COFFEE/TEA BREAK                                                                                  |
| 16.00 – 16.15 | Eleonore Blereau, Chris Clark, Pete Kinny, Richard Taylor, Tim Johnson, Eleanor Samson, Martin Hand  
Using rare earth elements in zircon to investigate the thermal history of a UHT terrane |
| 16.15 – 16.30 | Ruairidh J. Mitchell, Tim E. Johnson, Katy Evans, Saibal Gupta, Chris Clark  
Protolith heterogeneity, melt loss and the development of microstructures in granulites |
| 16.30 – 17.00 | Carl Spandler, Hugh St.C. O’Neill  
A litmus test for diffusion studies? |
| 17.00 – 17.15 | Yuan Mei, Weihua Liu, Joel Brugger  
Probing Metal Transport in the Deep Earth Using Molecular Simulations |
| 18.00 – 18.00 | BUS TO THE BOATSHELD RESTAURANT FOR THOSE SIGNED UP FOR THE DINNER                                |
POSTERS

MG ISOTOPES TRACE THE CARBONATION OF ULTRAMAFIC MINE WASTE
Hans C. Oskierski, Connor C. Turvey, Siobhan A. Wilson, Bogdan Z. Dlugogorski, Mohammednoor Altarawneh, Vasileios Mavromatis

STRESS ORIENTATION-DEPENDENT REACTIONS DURING METAMORPHISM
Jo Moore, Andreas Beinlich, Håkon Austheim, Andrew Putnis

CHLORO-HYDROXY-ZIRCON NANOPRECIPITATES: FINGERPRINT FERTILITY AND MINERALIZATION POTENTIAL OF GRANITIC MAGMAS
Liam Courtney-Davies, Cristiana L. Ciobanu, Max Verdugo-Ihl, Ashley Slattery, Nigel J. Cook, Kathy Ehrig

‘INVISIBLE’ AU IN PYRITE FROMolympic Dam DEPOSIT, SOUTH AUSTRALIA: BRIDGING TEXTURES WITH STATISTICAL ANALYSES
Marija Dmitrijeva, Max R. Verdugo-Ihl, Kathy J. Ehrig, Cristiana L. Ciobanu, Nigel J. Cook

OSCILLATORY GROWTH PATTERNS IN HEMATITE DEFINED BY Si-Fe-NANOPRECIPITATES: ORE ENRICHMENT PROCESSES IN BIFS
William Keyser, Cristiana L. Ciobanu, Max Verdugo-Ihl, Nigel J. Cook, Ashley Slattery, Kathy Ehrig

NATURAL AND SYNTHETIC ALUMINIUM-PHOSPHATE-SULPHATES UNDER ACID LEACH CONDITIONS: PATHWAYS TO RADIONUCLIDE REDUCTION IN COPPER PROCESSING CIRCUITS
Nicholas D. Owen, Nigel J. Cook, Rahul Ram, Joel Brugger, Mark Rollog, Kathy J. Ehrig, Danielle S. Schmandt, Cristiana L. Ciobanu, Benjamin P. Wade, Paul Guagliardo

SHEAR HEATING DURING EXHUMATION: AN EXAMPLE FROM THE NORDFJORD-SOGN DETACHMENT, HYLLESTAD, NORWAY
Sean Makin, Chris Clark, Tim E. Johnson, Andrew Kylander-Clark, Martin Hand

NANOSCALE INVESTIGATION OF DEEP METAMORPHIC FLUID
Tommaso Tacchetto, Steven M. Reddy, Chris Clark, David Saxey

THE FATE OF PRIMARY FLUID INCLUSIONS IN PERITECTIC GARNET FROM THE LOWER CONTINENTAL CRUST
Bruna B. Carvalho, Tommaso Tacchetto, Omar Bartoli, Bernardo Cesare, Omar Gianola, Fabio

EVIDENCE FOR RESUBDUCTION OF LAWSONITE-ECLOGITE DURING RETURN FLOW, SOUTHERN NEW ENGLAND OROGEN, AUSTRALIA

NON-EQUILIBRIUM AND EQUILIBRIUM SULPHIDE CRYSTALLIZATION IN MODERN SEAFLOOR HYDROTHERMAL SULPHIDE CHIMNEYS
Si-Yu Hu, Steve Barnes, Anais Pages, Joanna Parr, Ray Binns

TUNGSTEN-BEARING NANOPARTICLES IN HEMATITE: INSIGHTS INTO OPEN SYSTEM BEHAVIOUR OF MINERAL GEOCHRONOMETERS
Max R. Verdugo-Ihl, Cristiana L. Ciobanu, Nigel J. Cook, Liam Courtney-Davies, Kathy Ehrig, Ashley Slattery