



Mineralogical Society of Great Britain and Ireland

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THE MINERALOGICAL SOCIETY AND *ELEMENTS*



Caroline Peacock

A small number of volunteers has been recruited to help provide interesting material for inclusion in the Mineralogical Society pages of *Elements*. Kym Jarvis of Imperial College London offered the first such contribution, 'The Nuclear Question', in the February 2009 issue. The latest offering is by Caroline Peacock of Southampton University.

Sorption and incorporation of trace metals at mineral surfaces is a key control on the reactivity and cycling of trace-metal species in complex biogeochemical systems. As such, a fundamental and quantitative understanding of metal-mineral interactions is central to describing,

explaining and predicting a wide range of Earth and ocean processes. Increasingly, a multi-disciplinary approach is required to determine the complex interplays among mineralogical, physiochemical and biogeochemical factors responsible for the sorption, subsequent retention and stable isotope fractionation of key geo-relevant trace metals between natural solutions and mineral phases. In future issues, I will be highlighting exciting new research at the mineral-water interface, with particular focus on new molecular-level insights on metal-mineral interactions. Armed with an ever-improving knowledge of the small-scale processes that control the chemical reactivity of trace metals between minerals and natural waters, we are better able to determine some of the key controls on large-scale freshwater and marine chemistry and use the natural record of this chemistry in mineral phases to help explain the operation of Earth processes in the past and predict the response of these processes to future physical and chemical change.

Caroline Peacock

CLAY MINERALS' ASSOCIATE EDITOR PANEL



Manuscripts submitted to *Clay Minerals – Journal of Fine Particle Science* are handled by the Principal Editor, John Adams, and a panel of Associate Editors. There have been several changes to the panel recently, with the appointment of new editors from the United States, Australia, Spain and Greece. Below are some short notes about the panel. Papers for the journal should be submitted to specific Associate Editors or to the Principal Editor. See the journal's notes for the guidance of authors at www.minersoc.org/pages/e_journals/cm_authors.pdf.



DAVID BISH is the Haydn Murray Chair of Applied Clay Mineralogy at Indiana University in Bloomington, Indiana, USA. His research group focuses on a variety of mineralogical problems, both terrestrial and extraterrestrial, using a combination of X-ray powder diffraction, thermal analytical, calorimetric and isotopic methods. He has a long-standing interest in natural zeolites, their formation mechanisms, and the structural and thermodynamic nature of dehydration-induced phase transitions. He has also studied the interaction of hydrous minerals, including smec-

tites and zeolites, with H₂O, focusing on the behaviour of hydrous minerals on the surface of Mars. A new research area is the study of naturally occurring organic compounds in clay minerals.



CHRIS BREEN is Professor of Materials Chemistry at Sheffield Hallam University. He has worked on clay-organic complexes for over thirty years. His interests include acid-treated clays as catalysts, clay-organic interactions, and, more recently, the production, characterisation and use of clay-based polymer nanocomposites. These materials offer significant enhancements in mechanical, barrier and fire-resistant properties, and Chris is particularly involved in the study of these systems for the transport, construction and packaging sectors. Chris has been happily married to Catherine for 27 years, is the proud father of 4 strapping lads and likes to build things out of wood – much to the amusement of his family.



GEORGE E. CHRISTIDIS is Associate Professor of Economic Geology-Industrial Mineralogy in the Technical University of Crete, Greece. His research focuses on the study of the formation and growth of smectites in bentonites; the properties and industrial and environmental applications of natural and chemically modified clays, zeolites and industrial fillers; and the synthesis of pure zeolites. He is currently studying geological and geochemical factors controlling the distribution of smectite layer charge in bentonites and the influence of layer charge on bentonite properties.



JUAN CORNEJO is Research Professor in Soil Science at the Instituto de Recursos naturales y Agrobiología de Sevilla, Spain. He possesses wide experience in research on the surface and textural properties of clays and clay minerals. Clays and layered double hydroxides before and after organic modifications have been extensively studied for contaminated soil and water remediation and as slow-release pesticide formulations. He is working on the fate of pesticides in soil-water-sediment systems, and his recent research activities have dealt with multi-disciplinary national and European projects related to the study of factors and processes affecting the adsorption-desorption, degradation and transport of chemicals (especially pesticides) in soils. He is the author or co-author of 125 refereed (SCI) papers and another 100 refereed scientific publications.



ENVER MURAD – After stumbling through aberrations like petrofabric analysis, Enver finally arrived – via soil science – at the ultimate superlative of geoscientific work: clay mineralogy. Although almost everybody uses the hackneyed term “nanophase”, this is and remains the only suitable characterisation of the active constituents of soils. Working with museum-class minerals may be fun, but unravelling the secrets of nature's own nanophase materials using the necessarily complex techniques to characterise this difficult stuff has proven considerably more challenging and in the end more satisfying for him. Clay mineralogy being a border discipline, touching not only on clay minerals *sensu stricto* but also on the industrial applications of clays and related fields such as catalysis, makes this work even more interesting. Enver works at the Technische Universität München, and his principal field of specialisation in soil and clay mineralogy is Mössbauer spectroscopy.



BALWANT SINGH is an Associate Professor in the Faculty of Agriculture, Food and Natural Resources at the University of Sydney. Balwant's research interests include the understanding of mineral structure and chemical reactions of minerals in synthetic and natural systems, with an emphasis on heavy metals.



FRÉDÉRIC VILLIÉRAS is a CNRS Research Director at the Laboratoire Environnement et Minéralurgie (Nancy, France) and has internationally recognized experience in the characterisation and modelling of the surface reactivity of solids in a variety of geological materials. His research activities concern the relationship between structural properties and surface heterogeneity of clay minerals

and related materials. One of the main achievements of his research is the determination of basal and edge surface areas of clay minerals from argon low-pressure adsorption. Another part of his research concerns clay swelling and reactivity related to radioactive waste disposal in deep clay rocks.



LAURENCE WARR is a professor of economic geology at the Institute for Geography and Geology of the University of Greifswald in Germany. His research interests focus on the study of clay minerals and other fine-grained minerals formed under diverse geological conditions. His current projects cover a range of topics including diagenesis and very low-grade metamorphism, bacteria-clay interaction and the bioremediation of oil spills, the formation of bentonite and its use in the disposal of nuclear waste, and the role of clays and other fine particles in seismically active faults. Laurence also develops analytical tools for the in situ monitoring of fine-particle reaction kinetics in solution by X-ray diffraction techniques.

AVAILABLE FROM THE MINERALOGICAL SOCIETY

Landmark Papers

Metamorphic Petrology

NUMBER 3

The key benefit in the Landmark series is the commentaries by guest editors. Bernard Evans, in this case, places in context the chosen works and describes how they contributed to the advancement of the science. He weaves a fascinating tale. "Many metamorphic rocks are attractive in appearance, in hand specimen and in thin section under the microscope. Their aesthetic appeal touches senses beyond the merely scientific, a pleasure that most geochemists forego. Added to this is the satisfaction we derive as they reveal each new instance of nature's fidelity to scientific laws. But the aesthetic appeal comes at a cost. Metamorphic petrologists need to be adept in very many things: crystal chemistry, physical chemistry, phase equilibria, microscopy, textural analysis, regional geology, structural geology, geodynamics and geochronology."

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NEW VIEWS OF THE EARTH'S INTERIOR – MEETING REPORT

The legendary pugilist Muhammed Ali said, "The man who views the world at fifty the same as he did at twenty has wasted thirty years of his life." Our scientific understanding of the Earth shows no such failing, amply demonstrated by the recent 'New Views on the Earth's Interior' meeting held in the Geological Society premises in London in February 2009. This event, jointly supported by the British Geophysical Association and the Mineralogical Society of Great Britain and Ireland (through the Mineral Physics Group), certainly justifies the plural in the title, as it brought together eminent geochemists, mineral physicists, geodynamicists and seismologists from around the world to discuss recent developments in the study of our planet and beyond. The themes of discussion covered a broad chunk of the Earth's interior, from the crust to the remotest inner core, and out into space.

Perspectives were provided from theoretical, experimental and observational view points. Observations are provided by geochemistry and seismology: the images provided by seismology have recently been vastly enhanced by the availability of dense-array data.



Sebastian Rost (University of Leeds), Bullerwell Lecturer, at the 'New Views on the Earth's Interior' meeting

Presenters showed new, high-resolution images of continental lithosphere, subducting slabs, the transition zone, the enigmatic lowermost mantle region and the solid iron inner core. Seismology, however, primarily reveals velocity in the media it images. To convert this into an understanding of the building blocks of the Earth requires input from mineral physics, to describe the nature and behaviour of materials at interior conditions. For example, computational ab initio methods directly model the quantum mechanical behaviour of materials at the atomistic level: these are being used to explore the crystal structure which is present in the inner core and the possibility of melt in the deep mantle. To study real samples, experimentalists must reproduce the vast pressures and temperatures in the planet's interior, which

is accomplished in large presses for the transition zone and using diamond anvil cells for the deep core. Results from such experiments exploring the nature of mineral phase changes at the top and bottom of the mantle were presented, as were new insights into the chemistry of the core. Finally, the understanding provided by experiments and computation are being combined in complex simulations of the thermal and chemical dynamics of the whole Earth: such predictions can be compared with the observations from seismology and geochemistry.

The presentations and surrounding discussions underlined a central theme: that the progress we have made and still desire to make requires collaborative effort across a number of disciplines and that such activities are only increasing in scope. This ensures that our views of the Earth's interior will continue to evolve and allow synonymous conferences in the future.

J. Wookey

Member of the Organizing Committee

MAPT – MICROANALYSIS, PROCESSES, TIME



Online registration for MAPT is now open. Go to www.minersoc.org/pages/meetings/MAPT/MAPT.html for information about the two short courses, the two field trips and the 17 thematic sessions taking place over three days in wonderful Edinburgh. Further information is available from Simon Harley, convenor (s.harley@ed.ac.uk).

