

7TH MID EUROPEAN CLAY CONFERENCE, DRESDEN, GERMANY, SEPTEMBER 2014: OVERVIEW OF THE CLAY MINERALOGICAL STUDIES

This Open Access (OA) special issue of *Clay Minerals* includes papers presented at the 7th Mid-European Clay Conference held on 16–19 September, 2014 in Dresden-Radebeul, Germany. Clay groups from eastern- and mid-European countries established in 2001 the first joint meeting called the “Mid-European Clay Conference” (MECC), to be held every second year. In 2014 the German-Austrian-Swiss Clay Group (DTTG) was in charge of the organization and is proud to fund the present OA issue. A broad spectrum of themes presented at this conference covered the importance of clay minerals and clays in geotechnical engineering, in the production of hydrocarbons, the storage of CO₂, the disposal of radioactive waste and other industrial applications, as well as classical subjects such as soil mineralogy, crystallography, diagenesis, surface properties of clay minerals and new developments in analytical methods.

Almost 30 manuscripts were submitted for possible publication in this special issue, of which the maximum possible number of 12 manuscripts was accepted finally. The topics covered in these manuscripts reflect the variability of themes presented at the conference. Additional manuscripts will be published in future, regular issues of *Clay Minerals*.

Wilkinson (2015) treats the question of whether nucleation of clay minerals controls the rate of diagenesis in sandstones. Because of the small size of clay minerals a large number of crystals must be nucleated to form an authigenic cement in sandstone. The rate of nucleation of a mineral is very different from the rate of crystal growth. However, this has, until now, not been considered adequately as a rate-determining process, which may account partially for the discrepancy between numerical computer simulations of both natural diagenesis and of reactions induced by the injection of CO₂ for storage or enhanced oil recovery. This work was presented as the ‘Clay Minerals Group Lecture’ of the British Clay Minerals Group (CMG) at MECC.

Warr and Ferreiro Mählmann (2015) summarized the round-table discussion at the MECC about new recommendations for illite Kübler index standardization procedures, including new adjustments of the upper and lower boundary limits of the Crystallinity Index Standard (CIS) scale based on an inter-laboratory correlation.

Ufer and Kleeberg (2015) show the application of parametric Rietveld refinement to characterize stacking defects that occur frequently in clay minerals. In their approach, a set of different measurements of the same sample was collected and fitted in one combined refinement process by connection of the structural models via external parameters, such as different sample pre-treatments and the use of random powder and oriented samples.

Dietel *et al.* (2015) characterized the crystal chemistry and structural parameters of a Na-rich rectorite from Arkansas, USA, as an interstratification of Na-dominated brammallitic (non-swelling) and beidellitic (swelling) layers by combining various methods such as X-ray diffraction and fluorescence, simultaneous thermal analysis coupled with mass spectrometry and TEM investigation.

The paper by Táborosi and Szilagyí (2015) is dedicated to the development of molecular cluster models for exfoliated kaolinite. These molecular models include both the octahedral and tetrahedral sheets of kaolinite and offer a structural platform for adsorption, intercalation, and delamination studies of exfoliated kaolinite at the nano-scale level. This is of great importance, since the knowledge of structure and particularly the differences between the exfoliated and original kaolinite hold the key for rationalized design of clay-based nanocomposite materials with tailored functionality.

Zsirka *et al.* (2015) describe two different preparation methods of kaolinite-based nanostructures. With mechanochemical treatment, pseudo-hexagonal and short tubular-type nanostructures were created; with a three-step intercalation process mainly tubular, or halloysite-like nanostructures were obtained.

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Tokarský *et al.* (2015) studied the effect of montmorillonite particles on the alignment of conducting polyaniline chains in differently prepared composites. With a combination of various experimental and modelling methods the successful intercalation was confirmed and characterized. The nanocomposites showed a greater and more anisotropic electrical conductivity than the polyaniline, prepared similarly, with a selective transmittance in the range 450–650 nm.

Schampera *et al.* (2015) characterized the external interface of an organoclay prepared from hexadecylpyridinium and bentonite with a combination of X-ray photoelectron spectroscopy and classical molecular dynamics simulations. The combination of experimental and modelling methods provided complementary and consistent insight into the orientation of the organic cations on the external surfaces of the montmorillonite.

Kulenkampff *et al.* (2015) applied positron-emission-tomography for direct observation of positron-emitting radiotracers to reveal anisotropic and heterogeneous effects in diffusion in Opalinus clay samples. The observed spatial variance of diffusion on the cm-scale has implications for understanding the fundamental process and for diffusional transport modelling.

Two papers are dedicated to geotechnical applications of clays. Haase and Schanz (2015) studied Ca-bentonite-polyacrylamide composites prepared with differently charged polymers and various polymer-Ca-bentonite ratios. The composites were characterized in terms of their macroscopic hydro-mechanical behaviour coupled with their microscopic structural and composite-formation characteristics.

Wolters *et al.* (2015) describe a multilayer sealing system (SANDWICH) installed at the Ibbenbüren coalmine (Germany) with self-compacting, high-density bimodal bentonite blends as sealing material. The results of the swelling pressure testing program showed that all requirements for the emplacement of the building materials were fulfilled allowing a successful underground construction of the sealing system.

Finally, Garcia-Valles *et al.* (2015) investigated the mineralogy and thermal properties of kaolin from Mexican deposits from Aocolco (Puebla), Agua Blanca (Hidalgo) and Huayacocotla (Veracruz) at the eastern Trans-Mexican Volcanic Belt, for their suitability as raw material for the ceramic industry.

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