



***11th Mid-European Clay Conference***

***Pilsen, Czech Republic***

***September 15 – 20, 2024***

**Table of Contents**

<b>About MECC</b>	<b>2</b>
<b>Events Schedule</b>	<b>5</b>
<b>Program Agenda</b>	<b>6</b>
<b>Posters</b>	<b>15</b>
<b>Important Conference Information</b>	<b>20</b>

## **About Mid-European Clay Conference**

The Mid-European Clay Conferences are international meetings open to anyone interested in research and/or application of clays, which since 2001 have gathered researchers from a wide range of backgrounds interested in clays from all over the world. These conferences are an effective way to spread information about the scientific and technological potential associated with natural clay resources and environmental problems, especially in Central Europe. Especially, the Central European Clay Group (Croatia, Czech Republic, Hungary, Slovakia, Poland) and the Clay Group Germany-Austria-Switzerland (DTTG) meet at this conference. The main objective of this internationally recognized conference is to bring together researchers, students and industrial partners and to discuss various fields related to clays, zeolites and other layered and silicate raw materials.

Previous MECC:

1st MECC ' 01 – Stará Lesná (Slovakia, 2001)

2nd MECC ' 04 - Miskolc (Hungary, 2004)

3th MECC ' 06 - Opatija (Croatia, 2006)

4th MECC ' 08 - Zakopane (Poland, 2008)

5th MECC ' 10 – Budapest (Hungary, 2010)

6th MECC ' 12 – Průhonice (Prague) (Czech Republic, 2012)

7th MECC ' 14 - Dresden (Germany, 2014)

8th MECC ' 16 - Košice (Slovakia, 2016)

9th MECC ' 18 - Zagreb (Croatia, 2018)

10th MECC ' 20/22 - Kliczków (Poland, 2020/2022)

11th MECC ' 24 - Pilsen (Czech Republic, 2024)

## **11<sup>th</sup> MECC 2024 - Topics of the conference**

1. Geology and mineralogy of clays
2. Identification of clay minerals
3. Modification of clay minerals and materials science
4. Physicochemical evaluation of clays
5. Application of clays in industry, medicine and environment
6. Computational methods in clay science
7. Clays in geotechnics
8. Teaching of clay science
9. General session

## **International Scientific Committee**

Pilar Aranda

Georgios Christidis

Arkadiusz Derkowski

Reiner Dohrmann

Barbora Doušová

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Erzsébet Harman-Tóth

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Tibor Németh  
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Sabine Petit  
Daniela Plachá  
Michael Lothar Plötze  
Fernando Rocha  
Kirill Shafran  
Gražyna Simha Martynková  
Dimitrios Papoulis  
Eva Scholtzová  
Anna Žigová

### **Local Scientific Committee**

Juraj Bujdák (Slovakia)  
Georg Grathoff (Germany, Austria and Switzerland)  
Jasmina Martinčević Lazar (Croatia)  
Béla Raucsik (Hungary)  
Marek Szczerba (Poland)  
Miroslav Pospíšil (Czech Republic)

### **Local Organizing Committee**

Miroslav Pospíšil (Chairman)  
Martin Šťastný  
Jana Schweigstilllová  
Pavel Hájek  
Milan Pšenička  
Radek Novotný

# MECC 2024 Events Schedule

## 15. 9. 2024:

14:00 – 19:00 Registration

19:00 Welcome Party in Emporio

## 16. 9. 2024:

12:30 DTTG board Meeting in Club

## 17. 9. 2024:

12:15 – 13:15 ECGA Meeting in Basso A

17:30 – 18:30 EB Clay Minerals meeting in Basso A

19:00 DTTG assembly meeting in Basso B

## 18. 9. 2024:

13:00 – 18:30 Guided tour in Pilsen, Brewery tour (16-18)

19:00 – 22:00 CNCG meeting at Salzman pub

## 19. 9. 2024:

16:00 Closing remarks

19:00 Conference dinner

## 20.9.2024

8:00 – 16:00 (estimated) Field Trip – **suitable footwear is necessary**

Excursion to Dnešice, Chlumčany, Horní Bříza – price 90 EUR  
Starting point – Parkhotel Congress Centre. The prices include coach transportation, admissions, printed guide, 2-course set menu including one beverage (beer or soft drink).

# Program Agenda

## Monday September 16

9.00 – 9.20 Opening ceremony

### Plenary session – Chair: Béla Raucsik

9.20 Uhlík P., Lexa J., Kureková V. Osacký M., Gread F.A., Varga P., Pálková H., Biroň, A. et al.: Perlites, bentonites, and zeolites from Slovakia – geology, properties and uses

10.00 – 10.20 Coffee break

### *Geology and mineralogy of clays*

#### Oral presentations – Chair: Béla Raucsik

10.20 Holzer F., Gier S., Plan L.: Varve-like sediments in caves from the northern rim of the Dachstein Massif (Austria)

10.40 Brčeková J., Šarinová K., Biroň A., Lexa J., Uhlík P., Osacký M., Gread F., Hodermarský J., Štepiga J., Pereszleny M.: Characterization of fluvial-lacustrine sediments and Siliceous sinter sediments at the Lutilla I bentonite deposit (Kremnické vrchy Mts., Slovakia)

11.00 Christidis G. E., Pozo M., Joubert L., Musso T., Pettinari G.: Characterization of smectite in bentonite beds from Lago Pellegrini, Neuquen basin, Argentina

11.20 **Christidis G. E., Guerineau R., Theodoridou N. G., Makri P., Varouchakis E. A.:** Distribution of smectite and smectite layer charge in the Aggeria bentonite deposit, Milos Island, Greece

## *Identification of clay minerals*

**Oral presentations – Chair: Béla Raucsik**

11.40 **Dietel J., Ufer K., Gröger-Trampe J., Kaufhold S., Dohrmann R.:** Interstratified illite-hydroxy-interlayered smectite – a disorder structure model for quantification using Rietveld refinement

**12.30 – 13.30 Lunch**

**Plenary session – Chairs: Anita Grizelj, Peter Uhlík**

14.00 **Rebelo R., Andrejkovičová S., Rocha F.:** Serpentinized ultramafic rocks from Cabeço de Vide (Portugal) - Linking geological processes on Earth and Mars

## *General session*

**Oral presentations – Chairs: Anita Grizelj, Peter Uhlík**

14.50 **Gilg H.A., Dussubieux L., Thoresen L., Allen R., Sturm E.V.:** Green clays as coloring agents in gemstones: An LA ICP-MS perspective of Ni- and Cr-bearing clay minerals in silica rocks

15.10 **Grathoff G., Perkins R., Stephens A.:** Weathering of feldspars in Pleistocene dunes along the Oregon Coast, USA

15.30 **Schellhorn M.:** 30 years' experience in clays and bentonites for high quality shaft sealings in underground mining – a historical overview

15.50 **Gerony F., Côme Thillaye Du B., Fanost A., de Viguerie L., Rollet A.-L., Mériquet G., Jaber M.:** *Tempera* paints based on green earth and yolk

**16.00 – 16.30 Coffee break**

**16.30 – 18.00 Poster session**

**18.00 – 19.00 Dinner**

## **Tuesday September 17**

**Plenary session - The George Brown Lecture –**

**Chair: Georgios Christidis**

9.00 **Emmerich K.:** Engineered barriers, the sandwich sealing system and the swelling of bentonites

**10.10 – 10.30 Coffee break**



## *Modification of clay minerals and materials science*

### **Oral presentations – Chair: Georg Grathoff**

10.30 **Derkowski A., Zięba A., Dohrmann R., Kaufhold S.:**

Cation exchange capacity measurement FOR bentonite-cement reactions in a nuclear waste disposal

10.50 **Derkowski A., Kuligiewicz A., Zięba A., Dohrmann R.,**

**Kaufhold S.:** Thermally-induced Fe<sup>2+</sup> and Mg<sup>2+</sup> fixation in smectite interlayers under dry- and wet-heating conditions

11.10 **Warr L.N., Thombare, B.R., Sudheer Kumar, R., Peltz,**

**M. Podlech, C., Grathoff, G.H.:** Advances in determining smectite compositions and their layer charge properties by transmission electron microscopy – energy dispersive X-ray (TEM-EDX)

11.30 **Bujdák J., Skoura E., Dadi N., H. Bujdáková H.:** Clay

Nanocomposite Thin Films Imparting Antimicrobial Properties to Polymer Surfaces

11.50 **Boháč P., Budzák Š., Planetová V., Bujdák J.:** Surface-

fixation induced emission in hybrid systems of layered silicates and organic dyes

**12.30 – 13.30 Lunch**

## **Plenary session - Chair: Juraj Bujdák**

14.00 Kaufhold S., Dohrmann R.: About the identification of fixed cations in smectites

### *Modification of clay minerals and materials science*

#### **Oral presentations – Chair: Juraj Bujdák**

14.50 Zimowska M., Śliwa M., Socha R.P.: Nanostructured mineral-based hybrid composites for energy-related applications

15.10 Simha Martynková G., Klecandová L., Kratošová G., Kupková J., Polívka J., Čech Barabaszová K.: Phyllosilicates for safe energy storage materials

### *Computational methods in clay science*

15.30 Gianni E., Scholtzová E.: Halloysite as a potential sorbent of irinotecan drug

15.50 – 16.10 Coffee break

### *Modification of clay minerals and materials science*

#### **Oral presentations – Chair: Maguy Jaber**

16.10 Matejdes M., Škorňa P., Slaný M., Klement R., Bujdák J., Kawamata J., Breu J.: Stimuli-induced optical modulation

16.30 Jędras A., Matusik J., Dhanaraman E., Fu Y.-P.,  
Cempura G.: Synthesis challenges of LDH/GCN  
heterostructures for the photodegradation of ESTRONE

16.50 Dziewiątka K., Matusik J., Herber M., Hill E., Cempura  
G.: Nanotubular photocatalysts based on kaolin group  
minerals for zearalenone degradation: Key electrochemical,  
structural, and morphological insights

**17.10 – 18.00 Poster session**

**18.00 – 19.00 Dinner**

## **Wednesday September 18**

### **Plenary session – Chair: Marek Szczerba**

9.00 Chryssikos G. D., Siranidi E., Hillier S.: Structural  
evolution of halloysite-(10 Å) upon drying

### *Computational methods in clay science*

#### **Oral presentations – Chair: Marek Szczerba**

9.50 Gianni E., Panagiotaras D., Pospíšil M., Scholtzová E.:  
Halloysite as a drug carrier for diclofenac; a computational  
study

10.10 Ličko J., Kalinichev A. G.: Actinyl adsorption on clays in  
the presence of organics – a molecular dynamics study

**10.30 – 10.50 Coffee break**

## *Application of clays in industry, medicine and environment*

**Oral presentations – Chair: Arkadius Derkowski**

10.50 Plachá D., Škrlová K., Zágora J., Rybková Z., Malachová K., Fernández-García M.: Long-term antimicrobial effect of polylactide-based composites suitable for biomedical use

11.10 Sudheer Kumar R., Warr L.N., Grathoff G.H., Thombare B.R.: Advanced smectite alteration and the role of accessory reactants at 180 °C: New experimental constraints on the stability of bentonite

11.30 Zucha W. J., Kuhn R., Bernard E., Plötze M.: Effect of magnesium-based cementitious binder on smectite for Earth construction

**12.00 – 13.00 Lunch (Guided tour to Pilsen 13.00 – 18.00)**

## **Thursday September 19**

**Plenary session – Chair: Eleni Gianni**

9.00 Szczerba M.: Combining molecular simulations with diffraction experiments of intercalated clay minerals

## *Computational methods in clay science*

**Oral presentations – Chair: Eleni Gianni**

9.50 **Tunega D., Gerzabek M. H., Böhm L.:** Modeling study of adsorption of halogenated benzenes on montmorillonite

10.10 **Muschielok C., Krüger S.:** Iron in dioctahedral smectites: A quantum chemical computational view on distribution, stability and redox behavior

### **10.30 – 10.50 Coffee break**

10.50 **Nugraha I., Thissen P., Emmerich K.:** Density functional theory study on stability of saturated Na-, K-, Ca- and Mg-Montmorillonite

11.10 **Pšenička M., Pospíšil M.:** Dynamic properties of clay-based nanomaterials described by computational methods

## ***Physicochemical evaluation of clays***

### **Oral presentations – Chair: Miroslav Pospíšil**

11.30 **Siranidi E., Chryssikos G. D., Derkowski A.:** In-situ H/D exchange in clay minerals

11.50 **Rybka K., Siranidi E., Chryssikos G. D., Skiba M., Derkowski A.:** Near-infrared and X-ray diffraction *in situ* studies of smectite rehydration kinetics

### **12.30 – 13.30 Lunch**

## *Physicochemical evaluation of clays*

**Oral presentations – Chair: Barbora Doušová**

14.00 **Dultz S., Sperhake F.**: Acidifying clays: Kinetics of Fe(II) oxidation and mineral contributions

14.20 **Weber Ch.**: Potentiometric titrations of clay mineral suspensions

14.40 **Asaad A., Nitsch A., Baille W., Emmerich K.**: Westerwald and Bavaria bentonites from Germany. A Mineralogical and geotechnical study

15.00 **Gread Faisal A., Kureková V., Uhlík P.**: Using FTIR spectroscopy to estimate smectite content in bentonitic binary mixtures

15.20 **Kanik N. J., Kaufhold S., Derkowski A., Dohrmann R.**: Enhanced quality control of bentonites in the Bavarian mining district achieved by smectite layer charge determination

**15.40 – 16.00 Closing remarks**

**16.00 – 16.20 Coffee break**

**19.00 – 22.00 Conference dinner**

## Conferenza

Poster presentations – Chair: Milan Pšenička

### *Geology and mineralogy of clays*

P01 **Grizelj A.:** Mineralogy of pelitic quaternary sediments on the slopes of Medvednica Mt. (Croatia)

P02 **Koubová M., Laufek F., Hanusová I., Szczerba M., Vašíček R.:** The cation fixation in BCV 2017 bentonite after heating; laboratory experiments

P03 **Osacký M., Bai Y., Uhlík P., Čaplovičová M., Pálková H.:** Properties of various technological types of K-bentonite from Dolná Ves deposit (Kremnické vrchy Mts., Slovakia)

P04 **Raucsik B., Varga A., Benkó Zs., Homonnay Z., Pál-Molnár E.:** Clay mineralogy and K/Ar geochronology of phyllosilicate-rich rocks of the Păiușeni Complex (Highiş Mountains, SW Apuseni, Romania)

P05 **Varga A., Raucsik B., Benkó Zs., Pál-Molnár E.:** Evidences for cretaceous metamorphism in the zemplinicum: Illite 'crystallinity' and geochronological data from the pyroclastic rocks of the carboniferous Šimonov vrch Formation (Slovakia)

### *Identification of clay minerals*

P06 **Lenhardt K.R., Rennert T., Mikutta R.:** X-ray photoelectron spectroscopy reveals the chemical environment of Al and Si in secondary silicates

P07 **Vaculíková L., Vavro M., Vavro L., Daněk T., Martaus A.:** FTIR and Raman spectroscopy of asbestos minerals

## *Modification of clay minerals and materials science*

P08 **Čech Barabaszová K., Holešová S., Plesník L., Martynková Gražyna S.:** Surface characterization and bulk properties of the mechanical treated Zinc Oxide/vermiculite powder

P09 **Dziewiątka K., Matusik J., Kuc J.:** Photodegradation of zearalenone with kaolinite nanotubes-based photocatalysts: mechanisms and pathways

P10 **Girová A., Škvarla J.:** The polyelectrolyte gel-like model of clay swelling

P11 **Katoh M., Dultz S., Guggenberger G.:** Combined effect of clay minerals and calcium carbonate precipitation at wet-dry cycles on aggregate formation and stability

P12 **Kupková J., Simha Martynková G., Kratošová G., Sanchez V.Y., Antonowicz M.:** Microcellular cordierite ceramics to address environmental aspects of energy storage materials



- P13 **Kureková V., Kováčik D., Bilská K., Bujdáková H., Pribus M.**: Formation and properties of trimethyl chitosan/smectite nanocomposites
- P14 **Dziewiątka K., Matusik J., Herber M., Hill E., Cempura G.**: Nanotubular photocatalysts based on kaolin group minerals for zearalenone degradation: Key electrochemical, structural, and morphological insights
- P15 **Planetová V., Boháč P., Bujdák J.**: Luminescence enhancement in hybrid materials composed of Benzothiazole-based dyes and layered silicates
- P16 **Plevová E., Vaculíková L., Vallová S., Valovičová V., Hundáková M.**: Smectite composites for water decontamination from pharmaceutical micropollutants
- P17 **Pribus M., Bizovská Kureková V., Barlog M., Jankovič Ľ., Madejová J.**: Preparation and characterisation of montmorillonite/poly(2-ethyl-2-oxazoline) nanocomposites
- P18 **Slaný M., Jankovič Ľ., Matejdes M., Madejová J.**: Physicochemical aspects and near-IR study of hydration properties of poly(2-ethyl-2-oxazoline) and poly(diallyldimethylammonium chloride) functionalized montmorillonite
- P19 **Valovičová V., Dolinská S., Vaculíková L., Plevová E., Znamenáčková I.**: Removal of Cd (II) ions by adsorption on inorganically modified montmorillonite composite

## *Application of clays in industry, medicine and environment*

P20 **Böserle Hudcová B., Antelo J., Komárek M.**: Mechanisms of oxyanion removal by carbonate-based layered double hydroxides: a combination of adsorption modeling and solid-state analyses

P21 **Doušová B., Bedrnová E., Pilař L., Lhotka M., Koloušek D., Maxová K.**: Adsorption properties of aluminosilicate-fly ash composites

P22 **Hohmann M.**: From raw material to low-CO<sub>2</sub> binder - Meta-clay production for building material applications

P23 **Holešová S., Čech Barabaszová K., Hundáková M., Kratošová G.**: The role of antimicrobial clay nanofillers on the structure and degradation of polycaprolactone nanocomposite films: a comprehensive study

P24 **Schnee L.S., Mikutta R., Sanda M., Danra D.D., Yatahai C.M., Mikutta Ch.**: Mineralogical composition controls soil organic carbon in tropical vertisols

P25 **Starigk E., Grathoff G., Kumar R.S., Schlosser J.**: Mineralogical changes in SAZ-2 bentonite reacted with potassium oxalate after Ca saturation of two 8-month test series at 25 and 200 °C

P26 **Zimowska M., Kharytonau D., Skowron K., Mordarski G.:**  
In situ formation of LDH-based nanocontainers on Zn alloy – a  
detailed investigation of their morphology and structure

## *Computational methods in clay science*

P27 **Gianni E., Scholtzová E., Tyrologou P., Couto N., Papoulis D., Koukouzas N., Pospíšil M.:** Halloysite as a sorbent of  
forever chemicals and pesticides for soil decontamination

P28 **Manzel T., Thombare B., Warr L.N., Grathoff G., Kaufhold S.:** Focused Ion Beam – Scanning Electron  
Microscopy (FIB-SEM) tomography and computer vision (CV)  
of the pore structure of repository relevant claystones:  
Methodology and outlook

P29 **Novotný R., Kovanda F., Brus J., Pospíšil M.:** Molecular  
simulations study of atorvastatin in LDH

P30 **Pospíšil M., Lazaratou C.V., Vayenas D., Papoulis D.:**  
Molecular simulation of palygorskite and sepiolite pores for  
NO<sub>3</sub><sup>-</sup>-N and NH<sub>4</sub><sup>+</sup>-N sorption and desorption

P31 **Škorňa P., Jankovič L., Scholtzová E., Tunega D.:**  
Theoretical and experimental study of chromate pollutants  
adsorption by poly-(N-butyl ethyleneimine)-modified  
montmorillonite

## *General session*

P33 **Lhotka M., Doušová B.:** Characterization of clay minerals using adsorption technique

P33 **Uhlík P., Milovská S., Žatková L., Milovský R., Kyška-Pipík R., Starek D., Šurka J., Uhlíková B.:** Mineralogical and geochemical analysis of two soil profiles in the Lake Vinderel area, Maramures, Romania

## **Important Conference Information**

**Location** Unless otherwise designated, all sessions will take place in the plenary room: Conferenza in the Parkhotel

### **Registration Hours**

Sunday September 15, 2024 14:00 – 19:00

Monday September 16, 2024 8:00- 9:00

### **Name Badges**

All registered participants will receive a name badge that serves as an admission proof for the conference and functions relevant to each individual type of registration. Delegates, accompanying persons and guests are kindly requested to **wear the name badge visibly** at all times during the conference and activities.

## **Practical information**

### **Telephone**

The Czech Republic country code +420 is used for calling Czech Republic from abroad.

### **Important phone numbers:**

112 Emergency Central Number

158 Police

156 City Police

155 Ambulance

150 Fire Department