The Clay Minerals Society

www.clays.org

THE PRESIDENT'S CORNER

Jan Srodon

I am going to use my space in this issue to commemorate the **100th anniversary of the discovery of powder X-ray diffraction** by Peter Debye and Paul Scherrer in 1916. We clay scientists can paraphrase the famous phrase of British Prime Minister Winston Churchill from his 1940 wartime speech: "Never ... was so much owed by so many to so few." This discovery made it possible to study the structures of finely dispersed crystalline materials, such as clays. A few years later clay science was born.

The discovery that X-ray powder diffraction (XRD) could reveal crystal structures was made during the PhD research of Swiss physics student Paul Scherrer (1890–1969). He was supervised by Dutch professor of physics Peter Debye (1884–1966) at the University of Göttingen in Germany. Debye himself had been a PhD student at the University of Münich (Germany), where Roentgen (the discoverer of X-rays) was a professor and where, in 1912, Max von Laue discovered X-ray diffraction using a copper sulfate single crystal. In 1913, after reading von Laue's paper, Sir William Henry Bragg and his son, William Lawrence Bragg, both working at the University of Manchester (UK), formulated Bragg's law and solved the very first crystal structures: NaCl, ZnS, and diamond.

Early powder XRD studies were made with circular Debye–Scherrer cameras fitted with photographic film. I remember them still being in use in Krakow (Poland) in the 1960s, while diffractometers with paper recorders were already winning the battle. Digital imaging, which we now use, came in during the 1980s.

Clays had been suspected of having a crystalline structure because of their optical properties. But it was three pioneering studies that applied powder XRD to clays that confirmed their crystalline nature: in Sweden, it was Hadding (1923), in Germany it was Rinne (1924) and in the USA it was Hendricks and Fry (1930). In 1930, Linus Pauling solved the structures of micas, and then the chlorites, which inspired Gruner (1932) to determine the first full clay structure: that of kaolinite. A year later, Hoffman et al. (1933) presented a model for the expandable structure of montmorillonite, followed by Grim et al. (1937) who crystallographically defined illite. Finally, Hendricks and Teller (1942) recognized mixed-layer minerals and introduced the formalism describing X-ray diffraction from such structures.

A few years after these major breakthroughs, clay studies grew to such a volume that the first organization devoted to clays was formed: the Clay Minerals Group was organized within the Mineralogical Society of Great Britain and Ireland, and other countries followed suit. Clay science had entered its adult phase.

I hope you will find this anniversary review both interesting and useful. In today's world, the word "modern" has such positive connotations that we authors have a tendency to neglect literature older than a few years, which results in unconscious overestimation of our own contributions. This anniversary celebration may help to restore the balance.

Jan Srodon (ndsrodon@cyf-kr.edu.pl)
President, the Clay Minerals Society

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STUDENT RESEARCH SPOTLIGHT

Congratulations to **Eleanor Olegario-Sanchez** (University of the Philippines in Diliman, Quezon City) and **Nathan Rabideaux** (Georgia State University in Atlanta, Georgia, USA) for each winning a 2016 CMS Student Research Grant!

Eleanor Olegario-Sanchez, in collaboration with Mark Christian Pelicano and Jenichi Felizco aims to modify and characterize metal ion–exchanged natural Philippine zeolites and determine their antimicrobial activity towards different classes of bacteria, such as *Staphylococcus aureus* and *Escherichia coli*. Natural zeolites first undergo some preconditioning, such as acid treatment followed by sodium loading, before four types of metals are incorporated: copper, iron, silver and zinc. The modified zeolites are characterized by field-emission scanning electron microscopy with energy-dispersive X-ray analysis (FESEM-EDX); X-ray diffraction (XRD); X-ray fluorescence (XRF); BET (Brunauer, Emmett and Teller) surface area analysis; and X-ray photoelectron spectroscopy (XPS). In addition, cyclic voltammetry assesses the redox behavior of the antimicrobial metal agents encapsulated within the zeolite. This work should make possible the development of zeolite clays as carrier support materials having antimicrobial properties.

Nathan Rabideaux uses the mineralogical and geochemical analysis of terrestrial sediments to reconstruct high-resolution records of Quaternary environmental change near rift lake basins in East Africa. He is particularly interested in how authigenic minerals reflect evolving lake water and soil geochemistry in response to climatic and tectonic forcing. His research is part of a collaborative drilling, coring, and outcrop study that aims to understand climate and environmental change during the Pliocene–Pleistocene in East Africa and how that change relates to hominin evolution and cultural adaptations.

CLAY MINERAL SOCIETY ANNUAL MEETING

The 54th Annual Clay Minerals Society Conference (www.cms2017.com) will be held 5–8 June 2017 in Edmonton, Alberta (Canada) in conjunction with the Oil Sands Clay Conference. The conference is being organized by the Centre for Oil Sands Sustainability and the Clay Minerals Society and will be supported by BUKSA Associates. The program will include the 10th Canadian Powder Diffraction Workshop (Friday to Sunday, June 2–4), a "Dinosaur Hunting in Drumheller" field trip (Saturday, June 3), and Introduction to Oil Sands Clays (Sunday, June 4) prior to the meeting; trade show and tours of the Northern Alberta Institute of Technology and University of Alberta during the conference; and an oil sands tour on Wednesday afternoon and Thursday (June 7–8).

Session titles and topics include:

- "Structure and Properties of Clays"— clay structure, clay modeling, clay nomenclature.
- "Clay Minerals and Health"— use of clay minerals in medicine and beauty products/treatments.
- "Clays and Genomics/Microbiology"— clay interactions with microorganisms/proto-microorganisms.
- "Clays in Oil and Gas"— drilling, fracking, shale gas, tight gas, enhanced oil recovery, and exploration geochemistry.
- "Clays in Mining"— methods for improving selectivity of mining, impacts of clay in non-clay mining processes, and hydrometallurgy/pyrometallurgy.
- "Clay/Organic Interaction and Clay/Polymer Interaction"— fundamentals of the interaction of clays with various organic compounds, including polymers, solvents and proteins.
- "Clays in Water/Solid Separation Processes"— how clays impact solid/liquid separation processes including sedimentation, thickening, centrifuging, and filtering.
- "Clays in Rheology"— this session will focus on the rheological properties of clay slurries.
- "Clays in Geotechnical Engineering"— dam foundations, consolidation, development of strength, and impact on freeze–thaw cycling/frost heave.
- "Clays and Soil Formation"— nutrient cycling and weathering, carbon capture.
- "Clay and Environmental Quality"— clay remediation and contaminant migration.
- Any other topic related to the conference theme.

Abstracts should be submitted by Monday, 20 March 2017 (11:59 PM MT).

CMS MEMBERSHIP RENEWAL

Please renew your membership for 2017!

Italian Society of Mineralogy and Petrology

www.socminpet.it

Dear colleagues,

Registration to the 2017 European Mineralogical Union (EMU) school is now open! Please spread the news!

The 2017 EMU school on Mineral Fibres: Crystal Chemistry, Chemical-Physical Properties, Biological Interaction and Toxicity will be held 19–23 June 2017 in Modena (Italy). The related EMU Notes volume will be also released during the school.

The school welcomes advanced graduate and PhD students, as well as young and experienced researchers with an interest in mineral fibres. The school will cover different multidisciplinary aspects related to the study of natural fibres. It is, thus, aimed at students with a background in biology, chemistry, geology, material science, medicine, and physics. This course is designed for those who strive to work in the field of mineral fibre and asbestos and for those who want to acquire a strong background in this specific area of environmental protection and a multidisciplinary open vision of the asbestos related problems.

For detailed information and REGISTRATION (ON-LINE) go to the web site: emu2017.unimore.it

Travel grants will be issued by EMU and IUCr (International Union for Crystallography) for young scientists participating at the school (see the web site for the details). Selection will be made by the school organizers. SIMP will support attendance (travel and accommodation) of Italian students. A call for applications will be issued by SIMP in the near future. Looking forward to seeing you in Modena!

The Chair of the EMU 2017 school