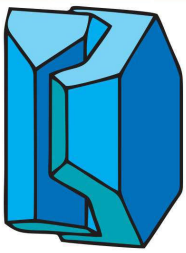
emc²

18–23 August 2024

4th european mineralogical conference • Dublin, Ireland

PROGRAMME AND ABSTRACTS



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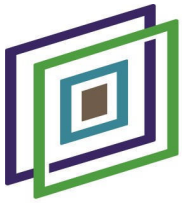

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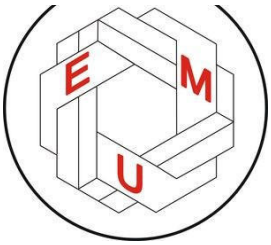

Mineralogical Society
of the UK and Ireland

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WELCOME

We are delighted to welcome all delegates, in-person and remote, to Dublin for this the fourth edition of the European Mineralogical Conference (EMC 2024). We hope that we can live up to the high standards set in Frankfurt, Rimini and Cracow.

Thanks to your enthusiasm and willingness to participate, we have a jam-packed programme for you to enjoy. We have sessions numbering up to 38, we have four plenary lectures and a public lecture to which all conference delegates are invited.

In addition, we have an ice-breaker reception and conference banquet to look forward to.

You should have received a copy of the 'Joining Instructions'. If not, it is available from the Conference Staff at registration/help desk. This should answer most if not all of the questions you may have. If it does not, please let conference staff/convenors know.

Our international team of volunteers will be identifiable by their t-shirts. They will be mostly responsible for running the hybrid aspect of our meeting ensuring that our remote participants have a rewarding conference experience.

From the perspective of the Mineralogical Society of the UK and Ireland, our President, Sally Gibson will be present at the conference to greet you. In addition, editors of two of our journals: Roger Mitchell (*Mineralogical Magazine*) and Jon Lloyd (*Geo-Bio Interfaces*) are also going to be in attendance. Make sure to say hello!

Finally, I encourage all delegates to visit the booths of our sponsors/exhibitors and engage with their representatives. Our conference could not run without their support and attendance.

Again, welcome to Baile Atha Cliath (Dublin). Tá súil againn go mbainfidh sibh taitneamh as do bhfuair gcuairt (we hope you enjoy your visit).

David Chew, Emma Tomlinson
Trinity College, Dublin

Russell Rajendra, Kevin Murphy
Mineralogical Society

Maciej Jaranowski
Polish Academy of Sciences, Kraków

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Pressure-driven crystal structure and fluids interaction in erionite-group zeolites

Battiston, T.[1], Lotti, P.[1], Comboni, D.[1,2], Gatta G.D.[1]

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The infiltration of molecules (or solvated ions) into the nano-cavities of microporous materials opens new routes for enhancing mass transfer from fluids to molecules incorporated in the structure. Thoroughly exploring this phenomenon, in both synthetic and natural zeolites, could expand their industrial applications, such as the development of new functional materials and enhancement of catalytic performance [1,2]. From a geological standpoint, understanding this phenomenon can unveil the role played by zeolites as fluid carriers during the early stages of subduction of oceanic sediments and altered basalts.

In this research, we examined the interaction between crystals and fluids, driven by pressure, in three distinct natural zeolites belonging to the ABC-6 group: erionite (ERI framework type, 6-membered ring sequence: AABAAC), offretite (OFF, with AAB seq.), and bellbergite (EAB, with AABCCB seq.). The objectives of the experiments were: 1) to understand the potential role of erionite as a fluid carrier during subduction, given its presence, as a secondary mineral, in altered oceanic basalts [3]; and 2) to compare the mechanisms employed by structurally similar frameworks (characterized by the presence of 6-membered rings) in accommodating bulk compression and adsorbing new molecules.

The investigation made use of in situ high-pressure synchrotron X-ray diffraction experiments on natural single crystals of erionite, offretite, and bellbergite, employing both potentially penetrating fluids (methanol:ethanol:water 16:3:1 mixture, ethanol:water 1:1 mixture, methanol, H_2O, liquid Ne) and non-penetrating *P*-transmitting fluids (silicone oil and daphne oil 7575). The use of the latters aimed to establish a benchmark for evaluating crystal-fluid interaction, as the adsorption of new molecules decreases bulk compressibility due to the "pillar" role played by guest species within the structural voids [1].

The results revealed that erionite exhibits the highest magnitude of adsorption among the three zeolites. Additionally, the occurrence and magnitude of the phenomena were found to be governed by the H_2O content of the hydrous *P*-transmitting fluids. Offretite framework allowed Ne atoms to penetrate into the 12mRs channel in response to applied pressure, exhibiting weak Van der Waals interactions with the extra-framework population.

On the other hand, natural bellbergite proved to be nearly inaccessible to guest molecules from *P*-transmitting fluids, emphasizing the pivotal role played by "secondary structural factors", such as the extra-framework content of the sample, on these phenomena.

References:

[1] Gatta GD et al. (2018) Phys Chem Miner 45:115-138
[2] Comboni D et al. (2020) Catal Today 345:88-96
[3] Vitali F et al. (1995) Clays Clay Miner 43: 92-104