Abstract Submission

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T3 - Minerals, systematics, gems, collections
On the labyrinthine world of open-framework minerals: occurrence, crystal-chemistry, properties and utilization

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P-induced crystal-fluid interactions in natural zeolites with ERI and OFF topologies
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Abstract Content: Open-framework minerals, such as zeolites, have extensively proved their ability to adsorb and host new molecules or solvated ions, also as a response to a pressure stimulus. This peculiar property might be exploited, among the others, for the production of new multifunctional materials or to enhance industrial catalytic processes involving zeolites. Furthermore, from a geological point of view, a comprehensive understanding of this property might unveil the role played by zeolites as fluids (*e.g.,* H_2O, CO_2, CH_4, NH_3, SO_2) carriers and moderators in the upper crust, *e.g.* during the early subduction of altered basalts or oceanic sediments.

In this study, we have investigated the high-pressure behavior and the *P*-induced crystal-fluid interaction of two different natural zeolites belonging to the ABC-6 family: erionite (AABAAC) and offretite (AAB) (ERI and OFF framework topologies), which, due to their structural similarities, are commonly associated in nature. Experiments were performed by *in-situ* high-*P* single-crystal synchrotron XRD, using diamond anvil cells (DAC). Different *P*-transmitting fluids have been used: i) non-penetrating silicone oil and ii) potentially penetrating alcohols:water mixtures and pure water.

The unit–cell *P-V* patterns unambiguously suggest the occurrence of a *P*-induced intrusion of molecules from the penetrating fluids, which induces a decrease in compressibility both in erionite and offretite. The magnitude of this phenomenon in natural erionite appears to be comparable to that observed in other synthetic zeolites (*e.g.*, $AlPO_4$-5, Si-FER), which, however, are characterized by almost empty structural cavities.

Disclosure of Interest: None Declared