High pressure intrusion of non-wetting liquid in hydrophobic Zeolitic Imidazolate Frameworks for mechanical energy storage/absorption

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ABSTRACT:

Heterogeneous lyophobic systems (HLS), which combine a lyophobic porous matrix and a non-wetting liquid, are one of the promising technologies to absorb and store the mechanical energy [1-4]. Depending on various physicochemical and structural parameters related to porous material combined with the nature of non-wetting liquid, HLS is able to restore, dissipate or absorb the mechanical energy supplied during the intrusion step and therefore to display a spring, shock-absorber or bumper behavior. In 2013, our team paved the way for the use of hydrophobic Zeolitic Imidazolate Frameworks (ZIFs) as porous matrix for HLS by studying “ZIF-8−water” system [2]. Since then, the energetic performance of others ZIFs-based HLS have been studied. The use of aqueous salt solutions as non-wetting liquid has been found as a way to improve energetic performance of HLS by the increase of intrusion pressure and the change of their behavior in some cases [3-4]. In this work, the influence of anion and cation nature on the energetic performances of “ZIF-8–aqueous salt solution” systems are studied on the example of potassium halides and alkali metal chlorides.

References

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