Hydrogen isotope separation through two-dimensional crystals

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Graphene and other two-dimensional (2D) crystals have recently been reported to be able to sieve hydrogen isotopes with both high hydrogen-to-deuterium selectivity and low energy consumption, at room temperature. This facilitates the potential developments of 2D materials-based isotope separation techniques. This talk will focus on the essential mechanisms for proton transport through 2D crystals, e.g. graphene and hBN, with unexpectedly high transport rates [1]. Then, discuss the origins of the isotope effects, the proton and deuteron separation factor and the performance and scalability of the prototype devices [2, 3]. Hydrogen isotopes transport with room temperature quantum sieving properties through atomic scale channels made of van der Waals crystals will be discussed as well [4].

References

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