Cost-effective and facile synthesis of porous carbon for hydrogen isotope separation

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In this work, we report on a cost-effective nanoporous carbon from bio-waste (peanut shell, gingko, and metasequoia leaves) is facilely synthesized via one-step carbonization in order to recycle and convert bio-waste. Carbonized samples contain a small quantity of metal and non-metal residues, resulting in naturally doped porous carbon.
The separation of hydrogen isotopes is one of the challenges in modern separation technology due to its almost identical size, shape and thermodynamic properties. As the quantum sieving in confined space or in existence of numerous strong binding sites has received increased attention as an efficient method for isotope separation, naturally doped porous carbon from bio-waste can be exploited as a quantum sieving material. Hence, we investigate D2/H2 molar ratio at various temperature of 20K~77K and calculated the selectivity through ideal adsorption solution theory method. Obtained results are compared with commercial activated carbon(Norit GAC 1240).
This work provides opens a new and facile avenue for enhancing the performance of an isotope gas separation adsorbent by using the cost-effective nanoporous carbon derived from bio-waste.