# Graphene and graphene-based materials for hydrogen storage applications

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Abstract
Hydrogen energy is considered the clean energy carrier for next-generation zero-emission vehicles, aiming to accomplish net-zero emissions by 2050.[1] However, onboard storage of the required amount of hydrogen in vehicles remains a challenging issue. 2D layered microporous materials are emerging as promising candidates for hydrogen storage applications. [2] Generally, materials for gas storage applications exploit the increase in gas density in the material's pores due to the overlap of adsorption potentials. Using porous materials, a gas is expected to store at a higher density than in compressed gas storage. The gas storage application potential of the porous material is characterized by its hydrogen adsorption isotherm. However, reproducible hydrogen storage data in these materials are prone to measurement errors. This paper presents recent advances in graphene and modulated graphene-based materials for hydrogen storage applications. Additionally, to address the experimental challenges of obtaining accurate hydrogen storage data in graphene and carbon-based materials, an international interlaboratory round-robin experiment was conducted. [3] Our experimental results on this international interlaboratory round-robin experiment will also be discussed.

References

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