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Facile Characterization of Pore Accessibility in Metal-Organic Framework/Polymer Composites

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Metal-organic framework (MOF)/polymer composites provide the possibility of combining the desired reactive and sorptive properties of highly porous MOFs with the desired mechanical properties of polymers to develop novel functional materials. Both MOF and polymer chemistries are complex leading to various degrees of material compatibility. It is desired to develop a facile measurement of the accessibility of MOF pore space within the composite matrix. Traditionally, N2 isotherms at 77K have been used to characterize pore space in porous materials. We found that using N2 isotherms to assess pore accessibility in MOF/polymer composites underestimates the true value. This is mostly due to the cryogenic temperature of the measurement being below the glass transition temperature of elastomeric polymers. However, composite synthesis and morphology also play a role in the measurement. Measuring CO2 isotherms at 0 ℃ was shown to be a facile, more accurate measurement of pore accessibility in MOF/polymer composites.

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