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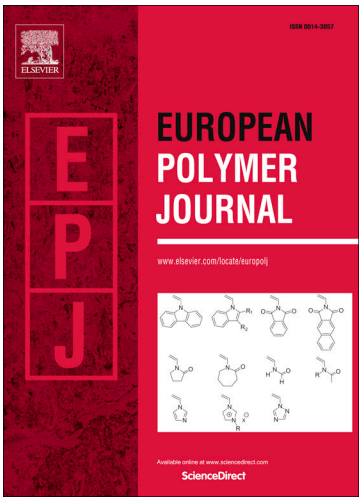

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PII: S0014-3057(18)31065-6
DOI: https://doi.org/10.1016/j.eurpolymj.2018.07.043
Reference: EPJ 8505

To appear in: *European Polymer Journal*

Received Date: 10 June 2018
Revised Date: 17 July 2018
Accepted Date: 24 July 2018

Please cite this article as: Sun, X., Li, J., Wang, W., Ma, Q., Constructing benzoxazine-containing porous organic polymers for carbon dioxide and hydrogen sorption, *European Polymer Journal* (2018), doi: https://doi.org/10.1016/j.eurpolymj.2018.07.043

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Constructing benzoxazine-containing porous organic polymers for carbon dioxide and hydrogen sorption

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Abstract Two novel benzoxazine-containing porous polymers, BPOP-1 and BPOP-2, have been synthesized by the direct Sonogashira-Hagihara coupling reactions of two brominated benzoxazine derivatives with a tetrahedral silicon-centered monomer. These polymers exhibit high porosity with the highest Brunauer-Emmer-Teller (BET) surface area of 623 m^2 g^{-1} and the highest total pore volume of up to 1.78 cm^3 g^{-1}. Porosity comparison with other benzoxazine-containing porous polymers shows that the introduction of tetrahedral silicon-centered units into the porous networks is an efficient strategy to improve the porosity of the final porous polymers. For applications, these polymers possess good carbon dioxide uptakes of up to 1.79 mmol g^{-1} (7.9 wt%) at 273 K and 1.0 bar, a comparably high binding ability with CO_2 with an adsorption enthalpy of up to 29.6 kJ mol^{-1}, as well as a moderate hydrogen uptake of up to 5.87 mmol g^{-1} (1.12 wt%) at 77 K and 1.0 bar. These values are comparable to or higher than other porous polymers with a level of surface areas and previously reported benzoxazine-containing porous polymers, thereby suggesting their potential applications as efficient solid absorbents for storing CO_2 and H_2.

Keywords porous organic polymers, benzoxazine; gas storage; carbon dioxide sorption; hydrogen sorption

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