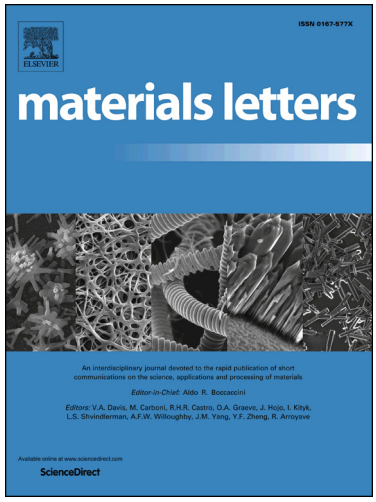

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PII: S0167-577X(18)31040-1
DOI: https://doi.org/10.1016/j.matlet.2018.07.008
Reference: MLBLUE 24574

To appear in: *Materials Letters*

Received Date: 25 May 2018
Revised Date: 28 June 2018
Accepted Date: 2 July 2018

Please cite this article as: B. Guo, S. Wu, Q. Su, W. Liu, P. Ju, G. Li, Q. Wu, New acetal-linked porous organic polymer as an efficient absorbent for CO_2 and iodine uptake, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.07.008

New acetal-linked porous organic polymer as an efficient absorbent for CO_2 and iodine uptake

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Abstract

An acetal-linked porous organic polymer (**APOP**) was synthesized by the *p*-toluenesulfonic acid-catalyzed acetalization reaction of 1,4-phthalaldehyde with 1,3,5-tris(3-*tert*-butyl-4-hydroxy-5-hydroxymethyl)phenyl benzene. The obtained polymer possessed amorphous structure and also exhibited excellent thermal stability, as revealed by powder X-ray diffraction (PXRD) and thermogravimetric analysis (TGA). The **APOP** were further characterized by solid-state ^{13}C nuclear magnetic resonance (NMR), fourier transform infrared (FT-IR), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The **APOP** exhibited a Brunauer-Emmett-Teller (BET) surface area of 490 $m^2\ g^{-1}$ with pore size distribution in the range of mesopores and the pore volume of 0.435 $cm^3\ g^{-1}$. The resulting polymer displayed the CO_2 uptake capacity of 85.7 mg g^{-1} at 273 K and 53.7 mg g^{-1} at 298 K (1 bar). Furthermore, the iodine adsorption performance of the **APOP** was also investigated, and it was found that the iodine uptake capacity could reach up to 220 wt%. These results were demonstrated that the **APOP** should be promising candidate for CO_2 and iodine uptake.

keywords: Porous materials, porous organic polymer, functional, CO_2 uptake, iodine adsorption.

1. Introduction

Porous organic polymers (**POPs**) have emerged as a new class of porous materials and exhibited superior properties such as high surface area, structural diversity, tailorable functionality, and unique physico-chemical stability. In recent years, **POPs** have attracted more and more interests due to their potential applications in gas storage and seperation [1], heterogeneous catalysis [2], and molecular sensing [3]. In this regard, a large number of **POPs**, such as covalent organic frameworks (**COFs**), [4] conjugated microporous polymers (**CMPs**), [5] and porous aromatic frameworks (**PAFs**) [6] have been