Editorial

Development and Fabrication of Advanced Materials for Energy and Environment Applications 2014

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Recently, environmental and energy problems have been receiving more and more attention. It is reported that advanced materials are promising applications in environmental and energy fields. Therefore, this special issue focused on the development and fabrication of advanced materials for energy and environment applications. It is expected that this special issue would provide a communication platform on the recent development of these fields.

The *Call for Papers* of the special issue was posted online on November 10, 2013, and closed for submission on February 21, 2014. We received 24 papers for submission in less than four months. Finally, 19 papers were selected for publication.

J. C. Wang et al. applied the hydrothermal method for the synthesis of the Cu/SAPO-34 catalysts with different Cu contents, which was modified by impregnating Pd. It was found that the Cu/SAPO-34 catalysts with Cu/Si ratios of 0.05, 0.1, and 0.2 had better de-NO_x activity than other catalysts, by the selective catalytic reduction by C₃H₆ and NH₃. Experimental results indicated that the maximum conversion of NO with Pd could reach 90%.

L. Zeng et al. reported the synthesis and characterization of calcium silicate hydrates by hydrothermal method, which was used to adsorb carcinogenic aflatoxin B1. It was shown that the adsorption followed the pseudo-second-order kinetic model and the data of equilibrium

adsorption were fitted to Langmuir and Freundlich equations.

The mechanism especially for H₂ molecules adsorption on solid C₆₀ under high pressure was proposed by H. Wang et al. via a first principle comparative study. They demonstrated that the initial H₂ adsorption on two adjacent C₆₀ gave a much lower barrier 1.36 eV in comparison with the barrier of adsorption on a single C₆₀ (about 3.0 eV).

S. Zhang et al. prepared the organic/inorganic super-absorbent hydrogels based on xylan and inorganic clay montmorillonite via grafting copolymerization of acrylic acid and 2-acrylamido-2-methylpropanesulfonic acid with *N,N*-methylenebisacrylamide as a cross-linking agent and potassium persulfate as an initiator. Experimental results indicated that the hydrogels exhibited the high compressive modulus about 35–55 KPa. The maximum equilibrium swelling ratios of hydrogels in distilled water and 0.9 wt% sodium chloride solutions were up to 1423 g g⁻¹ and 69 g g⁻¹, respectively. The effect of various cationic salt solutions (LiCl, CaCl₂, and FeCl₃) on the swelling has the following order: Li⁺ > Ca²⁺ > Fe³⁺.

X. Yu et al. prepared urea-formaldehyde paraffin capsules modified by β -cyclodextrin with excellent energy storage capacity using different emulsifiers. It was reported that OP-10 for use with PCMs as emulsifier had a better emulsifying

capacity, thermal stability, and mechanical stirring stability than SDBS for use with PCMs as emulsifier.

J. Wang et al. synthesized Mn/Si complexes in supercritical water using a tube reactor by a series of manganese salts ($\text{Mn}(\text{NO}_3)_2$, MnCl_2 , MnSO_4 , and $\text{Mn}(\text{Ac})_2$) and silicon materials (silica sand, silica sol, and tetraethyl orthosilicate). It was found that MnO_2 , Mn_2O_3 , and Mn_2SiO_4 could be obtained in supercritical water at 673 K in 5 min and the hydroxyl groups on the surface of SiO_2 from different silicon sources enhanced the reactivity of SiO_2 . H. S. Hassan et al. prepared zinc oxide with 94.9% dye removal ability within 1 h by sol-gel technique, which was a promising adsorbent material for dye decolorization from the polluted water.

As promising hydrogen storage materials, ammonia borane (NH_3BH_3) and hydrazine borane ($\text{N}_2\text{H}_4\text{BH}_3$) have hydrogen content as high as 19.6 wt% and 15.4 wt%. Z.-H. Lu et al. survey the research progresses in nanocatalysts for hydrogen generation from the hydrolysis or methanolysis of NH_3BH_3 and $\text{N}_2\text{H}_4\text{BH}_3$. Moreover, they synthesized well dispersed magnetically recyclable bimetallic CoNi nanoparticles supported on the reduced graphene oxide by one-step in situ coreduction of aqueous solution of cobalt(II) chloride, nickel(II) chloride, and graphite oxide with ammonia borane as the reducing agent under ambient condition. It was found that the CoNi/reduced graphene oxide nanoparticles exhibited excellent catalytic activity with a total turnover frequency value of $19.54 \text{ mol H}_2 \text{ mol catalyst}^{-1} \text{ min}^{-1}$ and a low activation energy value of $39.89 \text{ kJ mol}^{-1}$ at room temperature.

C.-d. Gao et al. prepared miscible, biodegradable poly(vinyl alcohol)/xylan blending films in the range of the PVA/xylan weight ratio from 1:2 to 3:1 by casting method using 1,2,3,4-butane tetracarboxylic acid as a new plasticizer. It was shown that blending films were biodegraded almost by 41% with an addition of 10% 1,2,3,4-butane tetracarboxylic acid in blending films within 30 days in soil.

As mentioned in the above results, this issue provides the recent development of advanced materials for energy and environment applications. More importantly, we hope that more attention should be paid to the research of these fields and rapid progress will be achieved in the near future.

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