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Editorial

Polymer Technology for the Detection and Elimination of Emerging Pollutants

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Polymer technologies, such as polymeric flocculants and ion exchange resin, have been widely used in the field of environmental science and engineering. During the past several decades, more damages to human health or ecosystem services have been linked to environmental contamination. It is essential to detect environmental contaminants and mitigate the toxic effects to human or ecosystem receipts. However, many environmental contaminants are persistent and recalcitrant to decomposition in the natural environment or conventional engineered approaches. Therefore, advanced polymer technology has become an attractive choice for detection and elimination of emerging pollutants. The purpose of this special issue is to provide the frontiers into the development and application of various polymer technologies for quantification and removal of these contaminants, such as biodegradable polymer materials and polymeric metal-organic frameworks and so on. All accepted papers are summarized as follows.

The paper by R. Gong et al. evaluated the effects of diethylhexyl phthalate (DEHP), a common plasticizer in industrial production, on the anaerobic fermentation process in waste activated sludge. The results revealed that DEHP primarily inhibited the solubilizationof protein and polysaccharide in the anaerobic fermentation system, but demonstrated no apparent effects on other processes. The presence of DEHP reduced the abundance of acetogen bacteria and increased the abundance of methanogens. However, no observed changes in the diversity of microbial communities, as well as the total yield and composition of short-chain fatty acids are found in the presence of DEHP.

The work by T. Chen et al. investigated the enrich metal in fly ash. Incompletely burning of carbon, glass microbeads, minerals, and other characteristic components were obtained by single-component separation. Electron microscopy analysis demonstrated that the metals were mainly enriched in the mineral fractions.Pt content in the minerals was virtually correlated with Ni and Cu contents. Enriched by gravity separation and flotation, the enrichment coefficients were 1.45 for Cu, 1.33 for Ni, 1.90 for Pt, and 1.60 for Pd with the recovery of at 77% (Cu), 81% (Ni), 97% (Pt), and 88% (Pd).

The paper by H. Yang et al. tested chitosan as a micro/nanofibrillar cellulose (MFC/NFC) aerogel-reinforcing agent. The mechanical strength of the aerogel was enhanced in the presence of chitosan with slightly tighter structures and improved water stability. Nanoparticles of silver (Ag-NPs) were then loaded in the reinforced aerogel.The results showed an excellent monolayer distribution on the aerogel. Compared to Ag-NP-loaded chitosan-reinforced NFC aerogel, Ag-NP-loaded chitosan-reinforced MFC aerogel exhibited all desired properties, such as large surface area, lighter density, more Ag-NPs loading, and even distribution. Both materials demonstrate great antibacterial activity.

The work by J. Yan et al. loaded the magnetite nanoparticles (MNPs) on cryogels with the basic structure of microfibrillar cellulose (MFC) and reinforced with chitosan. The MNP-loaded cryogels were tested for the removal efficiency of heavy metals from aqueous matrices. The adsorption capacities reached 2755 mg/g for Cr(VI), 2155 mg/g for Pd(II), 3015 mg/g for Cd(II), and 4100 mg/g for Zn(II).

In the paper of Z. Zhang et al., a novel heteropoly acid salt, $Na_6[Ni(Mo_{11}ZrO_{39})]\cdot 20\ H_2O$, was synthesized by the stepwise acidification and the stepwise addition of solutions of the component elements. The characterization results demonstrated that it has the Keggin structure. The conductivity value was measured at $1.23 \times 10^{-2}\ S\cdot cm^{-1}$ at 23°C and 60% relative humidity and increased with increasing temperature. The mechanism of proton conduction accords with the vehicle mechanism with a conductive active energy of $27.82\ kJ\cdot mol^{-1}$.

Conflicts of Interest

The editors declare that they have no conflicts of interest regarding the publication of this special issue.

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We would like to express our gratitude to all authors who made this special issue possible. We hope this collection of articles will be useful to the scientific community.

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