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FACILE SYNTHESIS OF Fe_3O_4@C BASED ON IRON SLUDGE AS HETEROGENEOUS PERSULFATE CATALYST FOR DEGRADATION OF ORGANIC CONTAMINANTS

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Iron salts (e.g., $FeCl_3$, $FeSO_4.7H_2O$ and PFCl) have been used widely as coagulant in drinking water treatment plant for removal of turbidity, color and natural organic matters. Simultaneously, large amounts of iron rich sludge are produced by drinking water treatment plants worldwide. Considering the high iron (ferric hydroxide) concentration in sludge, it could be beneficially reused as iron source with tremendous potential to prepare ferric oxide for catalysis of oxidation process. Persulfate [e.g. peroxydisulfate (PDS) and peroxymonosulfate (PMS)] has been increasingly recognized as a viable, alternative oxidation process for *in situ* chemical oxidation (ISCO), groundwater/soil remediation. Herein, we experimentally investigate the feasibility of reusing amorphous iron sludge to prepare Fe_3O_4@C magnetic particles (MPs), seen from characterization of XRD and FT-IR, through a facile solvothermal and pyrolysis method. Morphologic monitoring with a scanning electron microscope (SEM-EDS) revealed that during the solvothermal and pyrolysis process as-prepared Fe_3O_4@C aggregated to form surface of irregularly shaped particles with fine grains and displayed porous structure. The major chemical element components of Fe_3O_4@C contain C (24±0.2%), O (41.1%), Si (7.3±1.1%) and Fe (22±2.5%). These as-prepared sludge-derived particles are considered as an efficient heterogeneous catalyst for the activation of persulfates. More than 99% of methylene blue (MeB) was degraded within 15 min at 0.5 g/L PDS and 0.2 g/L Fe_3O_4@C, which was more efficient than PMS under the same condition. This study provides alternative iron sludge recycle method of converting water treatment residuals to the cost efficient catalysts for degradation of azo-dye and refractory organic contaminants.

Biography

Shijun Zhu is a Doctoral candidate in School of Municipal and Environmental Engineering, Harbin Institute of Technology (HIT), China. He has completed his Master's degree from HIT. His major is Environmental Engineering and his research focuses of environmental chemistry and materials, the development of sustainable water recovery and reuse, advanced catalytic oxidation of persistent organic contaminants in water and wastewater. He has published more than four papers as first author or corresponding author in domestic and foreign journals and has been invited by international journals as a Reviewer. In the past few years, he has continuously reviewed for international top-ranked journals like *Journal of Hazardous Materials, Frontiers of Environmental Science and Technology, Water Environment Research.*

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