

Fabrication of catalyst from heavy metal-containing waste

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With the development of modern industrialization, there are increasing amounts of heavy-metal wastes produced every day, such as electroplating sludges, heavy metal slags and tailings. For example, china yearly generates more than 1,00,000 tons of electroplating sludges, which is featured by high enrichment of metals (Ni, Cu, Zn, Fe, Mn, and Cr etc.) as well as organics. Currently heavy-metal wastes are disposed mainly by landfilling and brick-making. Unfortunately, the former would cause potential pollutions to the eco-environment and occupy the land, and the latter is usually accompanied by high risk of heavy metal volatilization at high temperatures. Thus, it is more desirable to recycle heavy-metal wastes properly so as to reduce the secondary pollution and save the limited metal resource. To this aim, our group successfully synthesized effective catalysts from heavy-metal wastes, and applied them in NO, H₂S and SF₆ removals. After various treatments, heavy-metal-waste derived catalyst contained 2~7% of carbon, 30~40% of transition metals. It was characterized by multi-metal supported carbon according to HRTEM. When being used in NO reduction, the catalyst showed great activity towards NO-SCR. The active temperature was 100°C lower than traditional SCR catalyst. NO removal amount per gram of catalyst was also extended for 10 times. The catalyst was also effective for H₂S oxidization and SF₆ decomposition. Therefore, our works indicated a novel strategy for the high-value-added utilization of heavy-metal wastes and production of effective catalysts at the same time.

Biography: Guangren Qian is currently the Deputy Director of Advanced Research Institute, Shanghai University. He is also a Professor of School of Environmental & Chemical Engineering, Shanghai University; Director of Professional Committee of Shanghai Solid Waste Management, Shanghai; Deputy Director of Professional Committee of National Industrial Ecology, China. Prof. Qian's research interesting included MSW solid waste management and hazardous waste management, heavy metals bearing waste-derived environmental materials exploring and application, biomass waste-derived biomass energy utilization and biochar utilization, biogas utilization of MSW solid waste leachate by EGSB bioreactor and enhanced AOD purification of refractory organic substances. At present, Prof. Qian focused on the high-value added utilization of environmental waste and its direct conversion into energy and energy-conversion catalyst. In the field of his research interests, Prof. Qian has more than 160 publications, including 35 patents, 5 books/chapters, 120 original and review papers with >3,000 citations.

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