Novel micro-structured carbon-based adsorbents for notorious arsenic removal from wastewater

ABSTRACT

The contamination of groundwater by arsenic (As) in Bangladesh is the biggest impairing of a population, with a large number of peoples affected. Specifically, groundwater of Gangetic Delta is alarmingly contaminated with arsenic. Similar, perilous circumstances exist in many other countries and consequently, there is a dire need to develop cost-effective decentralized filtration unit utilizing low-cost adsorbents for eliminating arsenic from water. Morphological synthesis of carbon with unique spherical, nanorod, and massive nanostructures were achieved by solvothermal method. Owing to their intrinsic adsorption properties and different nanostructures, these nanostructures were employed as adsorption of arsenic in aqueous solution, with the purpose to better understanding the morphological effect in adsorption. It clearly demonstrated that carbon with nanorods morphology exhibited an excellent adsorption activity of arsenite (about 82%) at pH 3, remarkably superior to the two with solid sphere and massive microstructures, because of its larger specific surface area, enhanced acid strength and improved adsorption capacity. Furthermore, we discovered that iron hydroxide radicals and energyinduced contact point formation in nanorods are the responsible for the high adsorption of As in aqueous solution. Thus, our work provides insides into the microstructure-dependent capability of different carbon for As adsorption applications.