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Mechanochemically improved surface properties of activated carbon cloth for the removal of As(V) from water

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Modified activated carbon cloth is prepared by mechanochemical modification of viscose rayon carbon cloth. The effects of different milling atmospheres, in the air and inert conditions, were investigated. Morphological and microstructural changes induced upon milling were comprehensive: breakage and collapse of cylindrical fibers; the lost of original turbostratic structure; micrometer-sized particles are formed, irregular in shape and sharp edges; particles showed tendency for gluing; surface of the fibers which have not been broken upon milling is still smooth. Increase in both, acidic and basic groups occurred upon milling in inert and air atmospheres. More pronounced effect of the increase of the number of basic groups, responsible for the arsenic removal, is achieved by modification under inert atmosphere (ACC_{inert}): approximately 5 times higher number of basic groups. pH_{PZC} values were increased from 4.46 to 5.04 and 5.77 after the air and inert milling conditions, respectively. The adsorption occurs through the formation of monolayer coverage of arsenic ions on the homogenous surface of the ACC_{inert} with maximum adsorption capacity of 5.3 mgg^{-1}. Further, adsorption of arsenic onto ACC_{inert} follows pseudo second order kinetics and chemisorptions is the rate-controlling step of adsorption process. Electrostatic and dispersive interactions between arsenic species and carbon particles are responsible for the mechanism of arsenic removal. By mechanochemical modification of activated carbon cloth it is possible to prepare new carbons possessing 'tailor-made' properties by simple, environmentaly friendly and low cost method of modification.

Biography

Ljiljana Lj Matović is a Senior Research Associate at Laboratory of Material Science, Institute for Nuclear Sciences, Vinča, Serbia. She has more than 10 years of experience in Material Science. She obtained PhD and Magistracy in Faculty of Physical Chemistry, University of Belgrade. She has begun her career in Laboratory of Radioisotopes, in the production and development of radiopharmaceuticals for diagnostic and therapeutic applications (from 2002 to 2008). Her main research fields are related to the design and synthesis of new composite materials for energy and environmental applications. She has an experience as a leader of national, bilateral and international scientific projects.

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