Abstract

Lack of safe drinking water gives rise to waterborne diseases and other human health risks caused by various pollutants. Safe water provision in low-income countries is constrained by limited financial resources, and the problem is worsened during natural disasters. Thus, there is need to develop efficient low-cost technologies for point-of-use water treatment. Filtration using ceramic filters is a viable method as it uses locally available clay and biomass. The aim of this work was to develop and fabricate a laboratory-scale ceramic filter for water treatment, and to evaluate its capacity to remove Cr(VI), methyl orange (MO), and *Escherichia coli* 0157:H7 from water. Locally sourced clay and sawdust (SD) were used to fabricate filters with varying sawdust contents of 0, 2.5, 5, 10 and 30% (w/w). The clay-sawdust composites were fired in a muffle furnace at a heating rate of 200 °C/h up to 600, 750, and 900 °C for 3 h. Then the clay filter (CF) with the highest permeability was impregnated with silver nanoparticles (AgNP) to produce AgNP-CF. The surface charge, functional groups, surface morphology, and crystallinity of the filters were determined using the pH-drift method, Fourier transform infrared spectrometry, scanning electron microscopy, and X-ray powder diffraction, respectively. The permeability increased with biomass content and firing temperature. The AgNP-CF removed 57.3, 69.1, and 100% of Cr(VI), MO, and *E. coli*, respectively. Overall, the study demonstrated that AgNP-CF can potentially be used for water treatment in low-income communities.