Bacteria adsorbing emergency water filters based on polyelectrolyte modified paper

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Abstract

Water filtration is a popular way to remove particles and microorganisms from drinking water but is generally based on size exclusion of the particles. Bacteria can be modeled as small particles with a diameter of 1-2 µm, which is usually too small to be excluded by paper filters. In this article, commercial available paper filters have been surface modified by polyelectrolyte multilayer adsorption to create a positively charged filter that can trap the negatively charged bacteria through electrostatic interactions. The polyelectrolyte modified filters bind the bacteria to their surface and will thereby remove bacteria from the water instead of inactivating them through addition of biocides. The modified filters can remove more than 99.9% of bacteria in water, depending on filter design, and has successfully been compared to a commercial cellulose water filter, based on the release of silver to inactivate bacteria. This cheap and easy modification of filter paper has potential to create disposable water purification filters that could be used in emergency situations to prevent outbreak of lethal diarrheal diseases.

Key word: Cellulose, disposable, Point-of-Use, water purification