Surface Modified Ceramic Filter for Water Purification

Summary:
The Surface Modified Ceramic Filter (SMCF) provides an inexpensive gravity filtration device for the removal of inorganic chemicals, organic chemicals, and pathogens from water. The surface modification is easily incorporated into traditional ceramic production methods, making this filter ideal for both industrial mass-production and remote operations in developing countries.

Overview:
Millions of people worldwide drink water contaminated with naturally occurring arsenic and other contaminants. Exposure to these contaminants is hazardous to human health and results in arsenicosis, cancer, and other diseases. Developing countries are particularly affected, thus an inexpensive and user-friendly solution is needed. Porous clay pot filters are currently used to remove dirt and bacteria but generally do not remove chemical contaminants. The SMCF improves upon this design with a simple surface coating that provides chemical filtration in addition to standard filtration.

Application:
The SMCF has many possible uses in home and commercial settings in both developed and developing nations. For example, families in developing nations could simply filter the water collected from a river or well through the SMCF to remove chemical contaminants (such as arsenic and industrial runoff) along with pathogens (including bacteria, protozoa, helminthes). The SMCF may also be incorporated into commercial products in the developed world (e.g., the United States) to remove fluoride and arsenic from drinking water supplies, to decontaminate water collected by backpackers and hikers, or to provide potable water in emergency situations.

How It Works:
The surface coating provides the ceramic filter with sorptive and reactive properties to simultaneously remove chemical and biological contaminants. The surface coating and the porous clay can work in conjunction to remove contaminants from drinking water for over one year of service without replacement (depending on the quality of the water source). The surface coating mixture can be selected to remove a broad suite of contaminants or optimized for specific contaminants found in a region.

Benefits:
The SMCF is inexpensive and works on a wide range of contaminants. The easy-to-use, low maintenance design allows seamless integration into daily life. The simple and inexpensive production method allows for disposal of the filter following use.

Why It Is Better:
The SMCF improves upon a previous design to increase the filtration of inorganic and organic materials through oxidative, reductive, and hydrolytic means.

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