

NanoLume™ Filter

A life-enabled self-cleaning water filter/water filtration assembly

“Pure Water. Powered by Light.”

Technology

This invention introduces a photocatalytic water filtration system designed to purify contaminated water using nanotechnology, capillary coils, and light-activated self-cleaning filtration. The system incorporates a spongy nanofiber-based photocatalytic filter bed within coiled capillary tubes. When exposed to sunlight or artificial LED light, the embedded metal oxide and carbonaceous nanoparticles degrade pollutants, making the filter self-regenerating. The system is powered optionally by solar panels and rechargeable batteries, making it suitable for off-grid use.

Market need

Global access to clean drinking water remains an urgent issue, particularly in rural and remote communities, disaster-struck regions, and developing countries with inadequate water infrastructure. Many existing water purification systems face significant challenges, including high maintenance requirements, frequent filter clogging or saturation, reliance on stable power sources, and potential chemical contamination. As a result, there is a strong market demand for a water purification solution that is low-maintenance, self-cleaning, solar-compatible, and both portable and affordable, especially for low-resource environments where infrastructure and technical support are limited.



Features

- Photocatalytic Nanofiber Filter Bed
- Self-Cleaning Mechanism
- Capillary Coil Design
- Solar or LED Activation
- Modular and Scalable Architecture
- Energy-Efficient Operation
- Portable and Durable Construction



Benefits

- Self-regenerating filter extends lifespan and reduces waste
- Removes organic pollutants, heavy metals, and microbes with high efficiency
- Operates using solar or LED light. No chemicals required
- Environmentally friendly and cost-effective solution
- Flexible deployment — from households to industrial settings
- Supports UN SDG 6: Clean Water and Sanitation



Industry

Water Purification

Potential Applications

- Rural and Off-Grid Water Supply: Delivers safe drinking water where infrastructure is limited.
- Disaster Relief and Humanitarian Aid: Portable, rapid-deployment purification in emergencies.
- Household and Community Filtration: Continuous, low-cost, self-maintaining water purification.
- Industrial and Mining Water Treatment: Cleans process water and reduces waste disposal costs.
- Agriculture and Aquaculture: Provides clean irrigation or aquaculture water without chemicals.
- Urban Greywater Recycling: Adaptable for smart cities and sustainable water systems.
- Military and Mobile Use: Compact, reliable, and renewable-powered purification.

Creators

Prof Edward Nxumalo
Mr Sithembela Zikalala
Mr Stanford Pedzisai

Dr Nozipho Gumbi
Prof Bheki Mamba

Stage of development

Early stage

Intellectual property

Patent Protection

Desired relationship

Co-development, Investors