



Next Generation Led-Chemical Home Drinking Water Purifier For Removal Of Organic Contaminants, Pathogens And Lead

Tech ID: 33298 / UC Case 2021-833-0

FULL DESCRIPTION

Background

Access to safe water and sanitation contributes to improved health and helps prevent the spread of infectious disease. Climate impact and freshwater scarcity pose an increasing challenge to access safe, clean water and will only exacerbate in the future. Furthermore, aging public water infrastructure, new pollutants of concern (for example, viruses, bacteria and an ever increasing list of toxic chemicals) and increasing household numbers require more distributed drinking water treatment. Current solutions are inadequate in that, they are:

- ▶ Not effective in the removal of contaminants, pathogens or metals and organics.
- ▶ Generate more secondary wastewater than treated water.
- ▶ Bulky and require significant capital costs and maintenance expenses.

Technology

Researchers led by Prof. Haizhou Liu have invented a next generation, light-emitting diode (LED) based chemical water purifier. The technology utilizes LED-based ultraviolet light and a photosensitizing chemical to disinfect and treat water, followed by a media filtration unit. UV light together with catalyst precursors is used to produce a group of photocatalysts (i.e., radicals) which include hydroxyl ion (OH^\cdot), free chlorine ion (Cl^\cdot), chlorine dimer (Cl_2^\cdot) and amino radicals (NH_2^\cdot). These radicals are reactive chemical species that attack pathogens, organic contaminants and inorganic contaminants.

Results from experimental testing of this innovative water purification system

Contaminant Category	Model Contaminant	Concentration in feed water	Concentration in treated water	Removal Percentage
Pathogens	Pathogenic E. coli strain O157-H7	5×10^4 cells/mL	$(5 \pm 2.5) \times 10^2$ cells/mL	$99 \pm 0.5\%$
Organic Contaminant	1,4-dioxane	20 $\mu\text{g/L}$	$0.6 \pm 0.2 \mu\text{g/L}$	$97 \pm 1\%$
Inorganic Contaminant	Lead	102 $\mu\text{g/L}$	$1.6 \pm 1.1 \mu\text{g/L}$	$98.5 \pm 1.1\%$

ADVANTAGES

- ▶ Efficient, reliable and affordable - disinfects nearly 100% of all contaminants including harmful organic and inorganic chemicals and pathogens while retaining beneficial minerals.
- ▶ Consumes only a fraction of energy, generates no heat and requires minimal maintenance.
- ▶ Generates no wastewater and achieves high flow rates.
- ▶ End product is dissolved oxygen which helps to improve the taste of water.

SUGGESTED USES

- ▶ Point of use, residential and commercial drinking water system.
- ▶ Municipal water treatment.
- ▶ Water recycling and reuse.

CONTACT

Venkata S. Krishnamurty
venkata.krishnamurty@ucr.edu
 tel: .

OTHER INFORMATION

KEYWORDS

lead removal, water treatment, drinking water, contaminants, PoU filter, UV

CATEGORIZED AS

- ▶ **Environment**
 - ▶ Remediation
- ▶ **Engineering**
 - ▶ Engineering
- ▶ **Materials & Chemicals**
 - ▶ Chemicals

RELATED CASES

2021-833-0

STATE OF DEVELOPMENT

- ▶ The inventors have moved from an experimental stage to the development of a working prototype.

INVENTOR INFORMATION

- ▶ Please review [all inventions by Prof. Liu and his team](#) at UCR
- ▶ Please visit [Prof. Liu's group website](#) to learn more about their research
- ▶ Please read [recent press coverage](#) of Prof. Liu

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	WO 2023/081206	05/11/2023	2021-833

Patent Pending

University of California, Riverside
Office of Technology Commercialization
200 University Office Building,
Riverside, CA 92521
otc@ucr.edu
research.ucr.edu/

[Terms of use](#) | [Privacy Notice](#) | © 2023, The Regents of the University of California