

A Built-In Mechanism Of Gas Maintenance In Microfeatures On A Submerged Surface

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SUMMARY

UCLA researchers in the Department of Mechanical and Aerospace Engineering have developed a novel superhydrophobic surface for drag reduction and anti-biofouling applications.

BACKGROUND

Superhydrophobic surfaces have unusual ability to repel water and may have utilities for applications including hydrodynamic drag reduction, de-icing, anti-corrosion, and anti-biofouling. For underwater applications, these surfaces must maintain their superhydrophobicity while submerged in a liquid. However, most superhydrophobic surfaces cannot retain the gas layer that makes them superhydrophobic under water in realistic conditions. Several approaches have increased the stability of the gas layer, but most of them are only preventive measures and are ineffective once the gas layer is disrupted.

INNOVATION

UCLA researchers led by Professor Chang-Jin Kim have developed a novel superhydrophobic surface using a microstructured surface with a built-in mechanism to generate and maintain gases on the surface in submerged environments. This innovative technology does not require an external power source to generate the gas and can be utilized to reduce drag on boats, increase flows through pipes, or prevent biofouling on surfaces.

APPLICATIONS

- ▶ Superhydrophobic surfaces
- ▶ Anti-biofouling coatings
- ▶ Water repellent and de-icing
- ▶ Drag reduction for boats
- ▶ Pipes or channels
- ▶ Anti-corrosion coatings

ADVANTAGES

- ▶ Generates and maintains gas on superhydrophobic surface
- ▶ Works in submerged environments
- ▶ Does not require an external power source

STATE OF DEVELOPMENT

Superhydrophobic surfaces have been fabricated and proven.

PATENT STATUS

| Country | Type | Number | Dated | Case |
|---------------------------------|-----------------------|-----------------------------|------------|----------|
| Republic Of Korea (South Korea) | Issued Patent | 10-2378963 | 03/22/2022 | 2015-021 |
| Japan | Issued Patent | 6773638 | 10/05/2020 | 2015-021 |
| China | Issued Patent | 107074524 | 01/17/2020 | 2015-021 |
| United States Of America | Published Application | 20240018980 | 01/18/2024 | 2015-021 |
| European Patent Office | Published Application | 4303451 | 01/10/2024 | 2015-021 |

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INVENTORS

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OTHER INFORMATION

KEYWORDS

superhydrophobic, superhydrophobic surfaces, microstructures, hydrophobic, anti-fouling coatings, anti-biofouling, submerged environments, microfluidic channel coating, water repellent, drag reduction, metal protection

CATEGORIZED AS

- ▶ **Biotechnology**
 - ▶ Health
 - ▶ Other
- ▶ **Engineering**
 - ▶ Engineering
 - ▶ Other
- ▶ **Medical**
 - ▶ Other

RELATED CASES

2015-021-0

| | | | | |
|--------------------------|-----------------------|-----------------------------|------------|----------|
| United States Of America | Published Application | 20180320717 | 11/08/2018 | 2015-021 |
| Germany | Published Application | 3169624 | 05/24/2017 | 2015-021 |
| France | Published Application | 3169624 | 05/24/2017 | 2015-021 |
| United Kingdom | Published Application | 3169624 | 05/24/2017 | 2015-021 |

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Membraneless Fuel Cell with Self-Pumped Fuel and Oxidant](#)
- ▶ [Methods of Restoring and Maintaining Gas Film on Superhydrophobic Surfaces while Underwater](#)
- ▶ [A Low-Profile Flow Shear Sensing Unit](#)
- ▶ [Complete Transfer of Liquid Drops by Modification of Nozzle Design](#)
- ▶ [Stereo Image Acquisition By Lens Translation](#)
- ▶ [Method of Fluid Manipulation By Electrodewetting](#)
- ▶ [Method for Commercial Production of Super-Hydrophobic Materials](#)
- ▶ [No-Assembly Devices for Microfluidics Inside a Cavity](#)
- ▶ [Liquid-Repellent Surfaces Made of Any Materials](#)
- ▶ [On-chip, Real-time Feedback Control for Electrical Manipulation of Droplets](#)
- ▶ [Micropumping of Liquids by Directional Growth and Selective Venting of Bubbles](#)
- ▶ [Microstructured Cathode for Self-Regulated Oxygen Generation and Consumption](#)

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