

Solution Coating of Inorganic Superhydrophilic Thin Film

Category
Novel Materials

A fully inorganic, transparent coating produced from solution at low temperatures with super-hydrophilic properties.

Image credit: I Stock (Niklas Storm)

Background

There is significant demand for anti-fog surfaces, such as for applications in lenses, mirrors, and autonomous vehicle cameras. Current anti-fog coatings fall into 2 main categories:

Polymer coatings: these have low durability due to being organic in nature

TiO₂ coatings: these are typically sputtered on in a high temperature vacuum process, and require UV activation

There is a need for inorganic superhydrophilic coating deposited from solution, with anti-fog and anti-scratch properties with high durability and economical mass production process.

Technology Overview

This is a fully inorganic, transparent coating produced from solution at low temperatures with super-hydrophilic properties (Figure 1).

Compared to other hydrophilic coatings which are organic in nature, the inorganic nature of this coating makes it more durable. It is deposited from solution and cured at room temperature, and adheres strongly to glass and metal. The super-hydrophilic nature imparts anti-fog functionality; in addition, it has various other desirable properties such as anti-scratch (5H pencil hardness), anti-bacterial and also is also self-cleaning when exposed to running water.

This is an aqueous silicate based coating. All components used in the formulation are non-toxic or have very low toxicity. Depending on processing conditions, hardness will be around 3H-5H, and adhesion to glass/metal is excellent (pass the cross-hatch test at highest grade). Coating is deposited from solution by standard methods (blade-coating, spray-coating).

The hydrophilic mechanism is believed to be due to ions in the coating.

Benefits

Various coating methods possible, eg. spin-coating, blade-coating

Low temperature (60 °C) coating

Completely inorganic

Not nanoparticle based – coating forms after deposition

Durable (up to 5H pencil hardness)

Anti-bacterial property (reduces E-coli growth by over 98%)

Self cleaning (sheeting effect of water washes dirt away)

Applications

Anti-fog surfaces

Swimming / diving goggles

Spectacle lenses

Car windows

Bathroom mirrors

Camera lens for autonomous vehicles

Self-cleaning surfaces

Opportunity

The team is looking for commercial partners to test the coating for their desired application, scale-up the coating for mass production.

Figures

Patents

Provisional patent applied.

IP Status

Patent application submitted

Provisional patent

Seeking

Development partner

Licensing

