TECH OFFER

Novel Self-Cleaning Nano Coating for Sustainable Solar Panel and Glazing Applications

KEY INFORMATION

TECHNOLOGY CATEGORY:
Chemicals - Coatings & Paints
Materials - Nano Materials
Green Building - Façade & Envelope
Sustainability - Sustainable Living

TECHNOLOGY READINESS LEVEL (TRL): TRL7
COUNTRY: HONG KONG
ID NUMBER: TO175236

OVERVIEW

With the rise of urbanization and an increasing emphasis on sustainability, durable self-cleaning coatings are crucial for maximizing solar panel efficiency and reducing building maintenance costs. In urban areas, solar panels can lose over 50% of their energy output due to surface contamination, while pollutants on building surfaces drive up the maintenance costs and degrade aesthetic appeal. Current self-cleaning coatings often suffer from poor adhesion, limited functionality, and lack of durability, limiting their industrial adoption.

To address these challenges, the technology owner has developed a novel self-cleaning nano coating for sustainable photovoltaic (PV) panels, as well as building and automotive glazing applications. Leveraging cutting-edge polymer graft modification and nano-encapsulation techniques, this transparent multifunctional coating offers durable hydrophilicity, high photocatalytic performance, and anti-reflective properties. Upon spray application, the coating quickly forms a high-density, super-wetting

nanofilm at room temperature. It can effectively reduce organic and inorganic pollutants under visible light, boosting solar panel efficiency by 15-20%. In addition to glass, this coating is applicable to various building surfaces, including cement, metallic, and composite panels.

The technology owner is seeking R&D collaborations and test-bedding partnerships with industrial partners, such as PV manufacturers, building owners / developers, construction companies, and transportation sector to integrate this coating into their products and applications.

TECHNOLOGY FEATURES & SPECIFICATIONS

This innovative coating technology stands apart from conventional coatings by incorporating a unique inorganic micro-nano hierarchical porous core-shell structure with doping-modified core materials. It combines durable hydrophilicity, high transparency, and enhanced photocatalytic performance under visible light radiation. The coating offers the following features:

- Great hydrophilicity: In-house synthesized organic segments provide long-lasting wetting properties and resistance against water
- Efficient photocatalysis: Doping-modified core materials expand the photo-response range to visible light, boosting photocatalytic efficiency
- Superior anti-reflection: Unique surface porous core-shell structure enables extremely high porosity, mechanical durability, and a low refractive index for anti-reflective properties
- High durability: Strong adhesion to substrates and weathering resistance ensure long lasting performance
- Easy-to-apply: Can be applied by spray coating with room temperature curing, quickly forming a high-density, super-moisture film with excellent adhesion
- Versatile application: Transparent coating applicable for glass, cement, metallic, and composite substrates
- Eco-friendly & cost-effective: Made from an alcohol-based solution with low raw material costs

POTENTIAL APPLICATIONS

Potential applications of this multifunctional coating include, but are not limited to:

- **Solar PV Panels:** Enhances energy efficiency by reducing surface contamination
- **Buildings:** Ideal for windows, curtain walls, skylights, and façades made of cement, metal, and composites
- **Automobiles:** Applicable to rear-view mirrors and windshields of vehicles and trains
- **Agriculture:** Suitable for greenhouses, indoor farming, and other agricultural environments
- **Other Applications:** Beneficial for any surface requiring self-cleaning, anti-reflective, or durable protection

UNIQUE VALUE PROPOSITION

- **Superior Performance:** Eliminates surface contamination, enhancing energy efficiency and increasing PV yield
- **Cost-Effective:** More affordable compared to other commercially available products
- **Easy Application:** Easily applied through spray coating with fast curing at room temperature
- **Versatile:** Suitable for various substrates, including glass, cement, metal, and composites