

POLYCHEM UV/EB INTERNATIONAL

Product Application Catalog

Product Application Catalog

UV/EB-Curable Zwitterionic Functional Surface Coating Solutions

Anti-biofouling Applications for Medical and Industries

Anti-Biofilm · Superhydrophilic · Biosensor · Optical · Drug Delivery · Lubricious · Industrial · Implant

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POLYCHEM CO., LTD. POLYCHEM UV/EB INTERNATIONAL · polychem.tw

About Polychem About Polychem

We specialize in zwitterionic functional surface coating technology that utilizes UV/EB (ultraviolet/electron beam) rapid curing. Based on a single core chemical platform, we have developed eight application solutions spanning medical devices, biomedical sensing, drug delivery, and industrial optics.

This Table of Contents, integrated with eight Product Technical Data Sheets (TDSs), helps customers quickly understand each application's performance, the pain points it addresses, and its technological advantages over traditional PEG (polyethylene glycol) coatings. It also provides guidance on selection for formal evaluation and proposal development.

<p>Non-Releasing · No Risk of Antimicrobial Resistance</p> <p>An anti-adhesion hydration mechanism replaces releasing biocides, eliminating active-agent depletion and avoiding the induction of antimicrobial resistance.</p>	<p>Oxidation-Resistant · Low Immunogenicity</p> <p>The zwitterionic backbone resists oxidative degradation, exhibits a cell-membrane-like structure, and minimizes immune recognition, thereby overcoming fundamental limitations associated with PEG.</p>	<p>UV/EB Curing in <90 Seconds</p> <p>Inline curing can be completed within seconds, making the system compatible with continuous high-volume manufacturing and scalable commercial implementation.</p>
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Technical Advantages and Applications

The table below summarizes the core performance metrics, pain points addressed, and major advantages over PEG-based coatings across the eight applications, enabling efficient comparison and solution selection.

# 應用 Application	Application Field Application Field	Core Performance Metrics Core Performance Metrics	Customer Pain Point Customer Pain Point	Advantages over PEG Advantages over PEG
01 Anti-Biofilm Coating	醫材 / Industrial Surfaces	Biofilm inhibition >98%; protein adsorption <20 ng/cm ²	Catheter-associated infections, depletion of releasing antimicrobials, and antimicrobial resistance concerns	Non-releasing anti-adhesion mechanism, no resistance risk, and durable oxidation resistance
02 Superhydrophilic Coating	Functional Surfaces	Water contact angle <10°; immediate anti-fog performance	Fogging on lenses/panels, difficult-to-clean surface fouling, and the illumination dependence of photocatalytic systems	Electrostatically hydrated superhydrophilicity, no dependence on light, and all-weather anti-fog/self-cleaning performance
03 Biosensor Coating	Biomedical Sensing	Protein adsorption <20 ng/cm ² ; significantly improved signal-to-noise ratio	Signal drift caused by nonspecific adsorption in complex samples and limited sensor service life.	Anti-fouling performance without compromising recognition, enhanced signal-to-noise ratio, and longer monitoring life
04 Optical Lens Hydrophilic Anti-Fouling Treatment	Optical Surfaces	Water contact angle <10°; low-haze anti-fog performance	Intraoperative endoscope fogging, oil and fingerprint contamination on lenses, and residual oily films from fluorinated layers	Hydrophilic self-cleaning, low haze, biocompatibility, and anti-fog functionality
05 Stealth / Long-Circulation Coating for Targeted Therapeutics	Drug Delivery	Extended circulation half-life; no ABC effect	Accelerated blood clearance (ABC) of PEGylated carriers, hypersensitivity, and pre-existing anti-PEG antibodies	Non-PEG stealth chemistry, low immunogenicity, and sustained efficacy under repeat dosing
06 Super-Lubricious Coating for Medical Catheter Surfaces	Medical Device Lubricity	Ultra-low coefficient of friction; instant lubricity upon wetting	Tissue damage caused by insertion/removal friction, embolic risk from particle shedding, and loss of lubricity over time	Strong hydration lubrication, low particle shedding, and combined anti-fouling/antimicrobial benefits
07 Anti-Fouling Self-Cleaning Coating for Industrial Lenses and Sensors	Industrial Surfaces	Superhydrophilic self-cleaning; anti-fog and anti-condensation	Performance degradation caused by outdoor fouling and fogging, resulting in inaccurate sensing and frequent manual maintenance	Hydrophilic self-cleaning, resistance to oily fouling, oxidation/weather resistance, and low maintenance requirements
08 Body Implantable Devices	Implantable Devices	Biofilm inhibition >98%; reduced foreign-body response and inflammation	Implant-related infection, fibrotic encapsulation/rejection, and chronic inflammation	Integrated triple-function performance, cell-membrane-mimetic structure, and promotion of early-stage healing

解決方案選型指引 | Solution Selection Guide

If You Need...	Recommended Solution
To suppress bacterial colonization and infection on devices or fluid pathways	01 Anti-Biofilm Coating
Anti-fog, anti-condensation, or self-cleaning performance for general functional surfaces	02 Superhydrophilic Coating

If You Need...	Recommended Solution
To improve sensor signal accuracy and operational lifetime	03 Biosensor Coating
Anti-fog and anti-fouling performance for medical or precision optics with biocompatibility	04 Optical Lens Hydrophilic Anti-Fouling Treatment
To extend in vivo circulation of nanocarriers and avoid immune clearance	05 Stealth / Long-Circulation Coating for Targeted Therapeutics
To reduce catheter insertion/removal friction and minimize tissue damage	06 Super-Lubricious Coating for Medical Catheter Surfaces
Self-cleaning, anti-fouling, and weather-resistant performance for outdoor or industrial optics	07 Anti-Fouling Self-Cleaning Coating for Industrial Lenses and Sensors
Anti-infection, anti-rejection, and anti-inflammatory performance for implantable devices	08 Body Implantable Devices

Application Performance Summaries

The following section provides an itemized summary of the eight applications, including core performance, customer pain points, comparison with PEG, and representative use cases. Please refer to the corresponding TDS for detailed data.

01 Anti-Biofilm Coating PLC-TDS-001

Anti-Biofilm Coating · 醫材 / Industrial Surfaces

Core Performance	Biofilm inhibition >98%; protein adsorption <20 ng/cm ²
Resolve Current Problems	Catheter-associated infections, depletion of releasing antimicrobials, and antimicrobial resistance concerns
Advantages over PEG	PEG is susceptible to oxidative degradation, and 44–72% of the population is reported to carry anti-PEG antibodies; this product offers oxidation resistance, low immunogenicity, and sustained performance over time.
Typical Applications	Urinary catheters, central venous catheters, dialysis tubing, ultrapure water systems, and food/pharmaceutical-grade contact surfaces

02 Superhydrophilic Coating PLC-TDS-002

Superhydrophilic Coating · Functional Surfaces

Core Performance	Water contact angle <10°; immediate anti-fog performance
Resolve Current Problems	Fogging on lenses/panels, difficult-to-clean surface fouling, and the illumination dependence of photocatalytic systems
Advantages over PEG	The hydrophilic performance of PEG declines after oxidative aging; this product offers long-term oxidation resistance and low immunogenicity, making it suitable for medical optics.
Typical Applications	Endoscopes, automotive windows/HUDs, architectural and solar glass, cold-chain doors, and AR/VR optics

03 Biosensor Coating PLC-TDS-003

Biosensor Coating · Biomedical Sensing

Core Performance	Protein adsorption <20 ng/cm ² ; significantly improved signal-to-noise ratio
Resolve Current Problems	Signal drift caused by nonspecific adsorption in complex samples and limited sensor service life
Advantages over PEG	PEG may lose anti-fouling performance after long-term oxidative aging; this product maintains a stable interface, exhibits low immunogenicity, and is advantageous for long-term implantation.
Typical Applications	Continuous glucose monitoring (CGM), implantable/wearable sensors, POCT, and SPR biochips

04 Optical Lens Hydrophilic Anti-Fouling Treatment PLC-TDS-004

Optical Lens Anti-Fouling · Optical Surfaces

Core Performance	Water contact angle <10°; low-haze anti-fog performance
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Resolve Current Problems	Intraoperative endoscope fogging, oil and fingerprint contamination on lenses, and residual oily films from fluorinated layers
Advantages over PEG	PEG-based anti-fog performance may diminish after use; this product offers long-lasting oxidation resistance and low immunogenicity suitable for medical optical applications.
Typical Applications	Rigid and flexible endoscopes, surgical microscopes, diagnostic imaging systems, machine vision, and consumer optics

05 Stealth / Long-Circulation Coating for Targeted Therapeutics PLC-TDS-005

Stealth / Long-Circulation Coating · Drug Delivery

Core Performance	Extended circulation half-life; no ABC effect
Resolve Current Problems	Accelerated blood clearance (ABC) of PEGylated carriers, hypersensitivity, and pre-existing anti-PEG antibodies
Advantages over PEG	Because 44–72% of the population is reported to have anti-PEG antibodies and PEGylated systems may face ABC effects and hypersensitivity, this product is designed to avoid pre-existing immune recognition and eliminate the ABC concern.
Typical Applications	mRNA-LNP systems, liposomal chemotherapy, siRNA/CRISPR delivery, and stealth modification for peptide therapeutics

06 Super-Lubricious Coating for Medical Catheter Surfaces PLC-TDS-006

Super-Lubricious Catheter Coating · Medical Device Lubricity

Core Performance	Ultra-low coefficient of friction; instant lubricity upon wetting
Resolve Current Problems	Tissue damage caused by insertion/removal friction, embolic risk from particle shedding, and loss of lubricity over time
Advantages over PEG	PVP/PEG lubrication may deteriorate after repeated use and carries a risk of delamination or shedding; this product uses covalent grafting to support repeated insertion/removal with low shedding.
Typical Applications	Cardiovascular and neurointerventional catheters/guidewires, urinary catheters, ureteral stents, and endoscopic instruments

07 Anti-Fouling Self-Cleaning Coating for Industrial Lenses and Sensors PLC-TDS-007

Industrial Optics Self-Cleaning · Industrial Surfaces

Core Performance	Superhydrophilic self-cleaning; anti-fog and anti-condensation
Resolve Current Problems	Performance degradation caused by outdoor fouling and fogging, resulting in inaccurate sensing and frequent manual maintenance
Advantages over PEG	PEG can age rapidly in outdoor conditions, while fluorinated hydrophobic layers may retain oily films; this product provides oxidation resistance, weather durability, hydrophilicity, and resistance to oily contamination.
Typical Applications	Autonomous/ADAS cameras and LiDAR, outdoor surveillance, machine vision, environmental monitoring, and solar optical systems

08 Body Implantable Devices PLC-TDS-008

Implant Multi-Function Coating · Implantable Devices

Core Performance	Biofilm inhibition >98%; reduced foreign-body response and inflammation
Resolve Current Problems	Implant-related infection, fibrotic encapsulation/rejection, and chronic inflammation
Advantages over PEG	PEG may undergo in vivo oxidation, and anti-PEG antibodies can contribute to immune encapsulation; this product is designed for oxidation resistance, low immunogenicity, and stable long-term implantation.
Typical Applications	Cardiovascular stents, artificial joints, pacemakers, vascular grafts, and dental/maxillofacial implants

Contact Us

For product evaluation, customized parameters, sample testing, and formal project proposals, don't hesitate to get in touch with us. Support is available to identify the most appropriate coating solution based on your substrate and manufacturing process.

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Disclaimer:

Actual performance varies depending on the substrate, process, environment, and application. Comparisons with PEG-based coatings are based on publicly available literature and general technical assessments. For detailed specifications, please refer to the corresponding TDS. The company reserves the right to revise the specifications at any time.