



GRAFTON[®]

Company Overview

Functional Materials Manufacturer
Reducing Hazardous Substances and Odorants
Through Proprietary Chemical Adsorption Technology

A Materials Development Company
Based on Functional Molecular Design

GRAFTON Co., Ltd.





Basic Principle of Chemical Adsorption

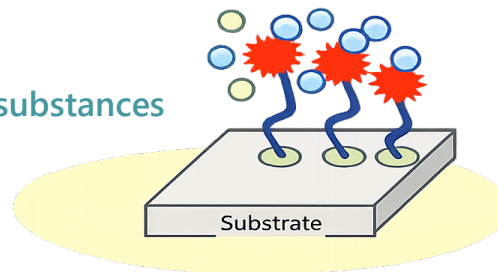
GRAFTON's functional materials achieve molecular-level chemical adsorption through reactions between functional groups introduced into the substrate and target hazardous substances, resulting in durable performance distinct from physical adsorption.

Structure-Based Classification of Chemical Adsorbent Materials

Features of Chemical Adsorption

- Molecular-level chemical reaction
- Structure that suppresses re-emission
- Long-term reduction performance
- Functional group design tailored to target substances

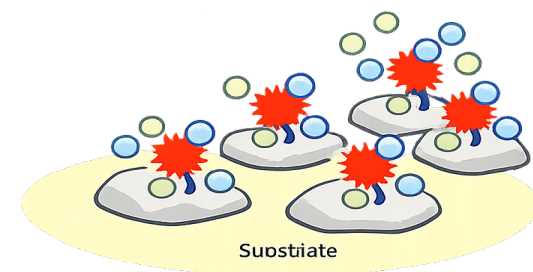
Copolymer-Type Chemical Adsorbent Material



Functional groups are introduced into polymer chains formed on the substrate, enabling chemical adsorption of hazardous

Copolymer-Type Chemical Adsorbent Material

Low-Molecular / Blended Chemical Adsorbent



Hazardous substances are chemically adsorbed by molecules containing reactive functional groups

Low-Molecular / Blended Chemical Adsorbent

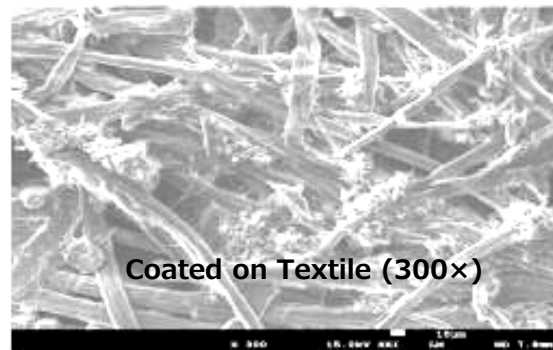
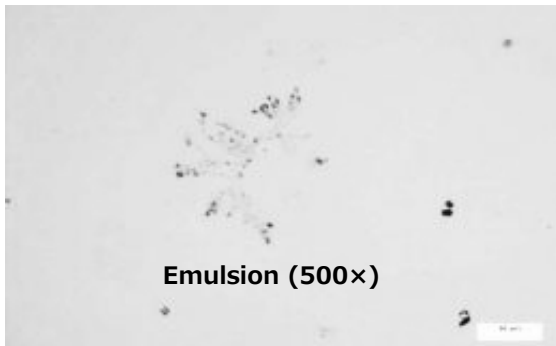
GRAFTON's Chemical Adsorption Material Technology(Based on Core Patented Technologies)

This technology enables the control of various hazardous and odor-causing substances by designing functional groups tailored to specific applications.

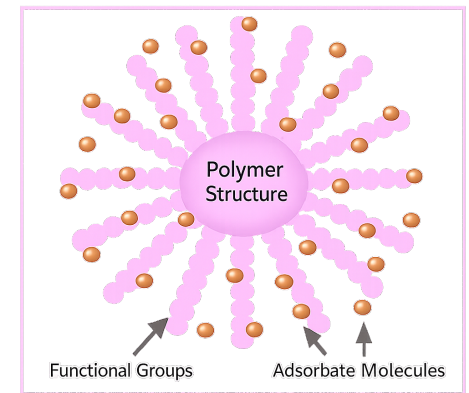


Structural Design and Performance Characteristics of Chemical Adsorption Materials

Chemical Adsorption Structure on Fiber Surface[Scanning Electron Micrograph]



Functionalized Polymer Structure (Copolymer-Type Schematic)



Adsorption Performance

Long-Term Chemical Adsorption Performance(Representative Service Life: Approx. 10 Years)

Product Example FXN-111-S6R	GRAFTON Cloth (Formaldehyde Adsorption Product)	Adsorption Rate (Evaluation: JIS A1905-1, Specimen Loading: 2.2 m ² /m ³) 20 μg/m ² ·h	High Adsorption Capacity: 30 mg/g Long-Term Product Performance: 10 Years
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Material Design Validated in Long-Term Service Environments

Safety

Grade: FXN

- Safety verified by multiple toxicity tests
- No re-emission after chemical adsorption
- No generation of byproducts or outgassing



Technology Framework of Functional Materials

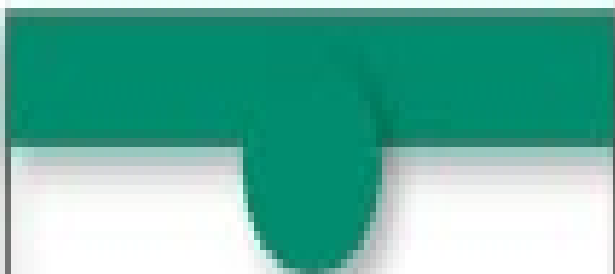
Core Technology Categories

Technology Framework of Functional Materials



**Chemical Adsorption Materials
(Core Technology)**

Functional materials designed to reduce harmful substances and malodorous compounds at the molecular level through chemical reactions between functional groups and target substances. A long-lasting technology based on chemical adsorption.
(GGA, LLST, GGG series, etc.)



**Radiation-Synthesized Materials
(Materialization Technology)**

Material modification technology that introduces functional groups into fibers, films, filters, and other substrates through radiation-induced polymer modification.
(FXN-111 series)



**Inorganic Functional Materials
(Applied / Supporting Technology)**

Chemical adsorption-type functional materials using inorganic reactive components such as metal salts. Hybrid designs combining organic reactive components are also available depending on the application.
(GGA series)



Main Technology Categories (by Reaction Mechanism)

Aldehyde Adsorption Technology

Technology that chemically adsorbs aldehydes such as formaldehyde suppressing re-emission through chemical reaction. (GGA series, etc.)

Amine and Sulfur Odor Control Technology

Odor control technology that reduces ammonia, amines and sulfur-based malodorous compounds through chemical adsorption reactions. (LLST series, etc.)

Composite Adsorption and Decomposition Technology

Applied technology that uses inorganic carriers and combined reaction mechanisms to reduce VOCs and complex odors over the long term. (GGG series, inorganic materials, etc.)

Key Technical Features



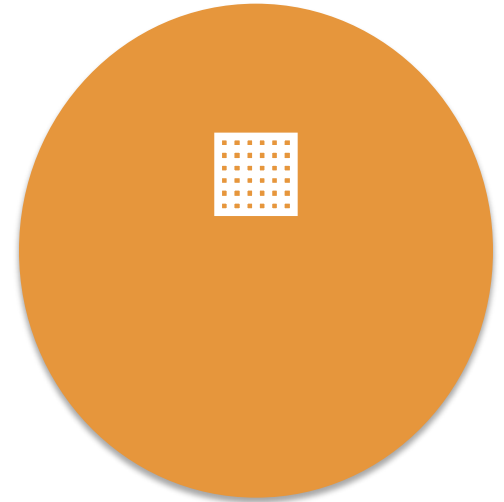
Fragrance-Free, Non-Masking

A fragrance-free, non-masking deodorization technology that directly reduces odor-causing molecules through chemical adsorption reactions.



Long-Lasting Performance

Reaction-type adsorption reduces the risk of re-emission, delivering stable and long-lasting deodorization effects.



Substrate Compatibility

A material design adaptable to diverse substrates such as textiles, resins, and inorganic carriers.

Technical Achievements and Application Fields

Construction & Housing Sector

- Formaldehyde reduction for plywood and decorative panels
- VOC reduction for residential interior materials
- Odor reduction during renovation projects

Living Environment Sector

- Countermeasures for pet and household odors
- Odor control in nursing care and medical facilities
- Reduction of tobacco and indoor odors
- Reduction of fire and decomposition odors

Industrial & Logistics Sector

- Reduction of rubber and resin odors
- Odor control for containers and warehouses
- VOC reduction for industrial products

Product Lineup ① | Air Quality & Odor Control at the Source

Molecular-level control of target substances

■ Air Quality Improvement (Chemical Control) For formaldehyde and VOC reduction

Product Name	Form	Primary Application	Features	Application Method
SFXN-111-S6R	Liquid	Formaldehyde	Molecular-level adsorption with no re-emission / Standard industrial grade	Coating / Spray
FXN-111-S6S	Liquid	Formaldehyde	Molecular-level adsorption with no re-emission / High-performance (high functional density)	Coating / Spray
FXN-111-S6-8	Liquid	Formaldehyde	Molecular-level adsorption with no re-emission / Designed for painted surfaces	Coating / Spray
GGA-5	Liquid	Formaldehyde	Molecular-level adsorption with no re-emission / Latest formulation with excellent handling	Coating / Spray
GGA-5-CT	Liquid	Formaldehyde	Coating-compatible formulation	Coating / Spray
GGA-5LAD	Liquid	Formaldehyde	Enhanced low-concentration performance (advanced model)	Coating / Spray
GGG-BTXS	Liquid	Benzene / Toluene	Effective for benzene and toluene	Coating
GGG-BTXS-CT	Liquid	Benzene / Toluene	Coating-compatible formulation	Coating
SuppliGel H	Gel	Formaldehyde	Localized treatment	Placement

■ Everyday Odor Control (Comprehensive) For general indoor and household odors

Product Name	Form	Primary Application	Features	Application Method
LLST-5	Liquid	General household odors	General-purpose odor control	Spray
LLST-5NW	Liquid	Pet odors	Low-irritation formulation	Spray
ZDS-100	Liquid	High-temperature odors	Stable performance at high temperatures	Spray
LLST-525	Liquid	Food waste / toilet odors	Specialized for thiol odors	Spray
LLST-TOB	Liquid	Tobacco odors	Optimized for tobacco odor control	Spray
LLST-PTS	Liquid	Fecal / urine odors	Specialized for waste-related odors	Spray
LLST-PTS+5-28	Liquid	Fecal / urine odors (care facilities)	Multi-odor control (daily/professional)	Spray
SuppliGel S	Gel	General household odors	Localized odor control (long-lasting)	Placement

Product Lineup ② | Medical & Specialized Applications

For high-intensity and specialized applications

■ Medical & Personal Applications (High-Intensity Odor Control) For biological and body-related odors

Product Name	Form	Primary Application	Features	Application Method
LLST-130, 210	Liquid	Malignant wound odor	Molecular-level odor control	Spray
LLST-5C	Liquid	Aging-related odor (nonenal)	Target-specific formulation	Spray
DDS-100Plus	Liquid	Biological odors	Targeted deodorization	Spray
DDS-100	Liquid	Biological odors	Minimizes re-emission	Spray
DDS-101	Liquid	Biological odors (fabric)	Effective for embedded odors	Spray
LLST-025	Liquid	Footwear odors	Specialized for footwear odors	Spray
LLST-085	Liquid	Food / spice odors	Effective for persistent odors	Spray
LLST-AAZ-P	Liquid	Body odor (professional)	Skin-compatible formulation	Spray
LLST-AAZ	Liquid	Body odor	Optimized for body odor control	Spray

■ Mold & Environmental Control

Product Name	Form	Primary Application	Features	Application Method
LLST-EMO	Liquid	Indoor deodorization	General indoor odor control	Coating
LLST-EMO-X	Liquid	Bathroom odor control	High-humidity performance	Spray

■ Specialized Applications (Extreme Environments) For high-intensity and complex odor conditions

Product Name	Form	Primary Application	Features	Application Method
LLST-100, 200	Liquid	Decomposition odors	High-performance for complex compounds	Coating / spray
LLST-220	Liquid	Fire / smoke odors	Suppresses re-emission	Spray
LLST-OT	Liquid	Rubber / industrial odors	Effective for difficult odors	Coating / spray
LLST-OT-WALL	Liquid	Wall contamination (rubber odors)	Designed for surfaces	Coating / spray

Track Record / Major Achievements

Year	Achievement / Project	Related Product / Notes
2001	Air quality improvement at nursing homes for a housing supply company	FXN-111 – Applied to building substrates
2001	Air filters for Shinkansen trains and smoking vehicles	Special agent radiation-grafted onto air filters
2005	Minato Ward: Mita Welfare Hall 'Grafton VOC Reduction Project'	FXN-111-S6 – Applied to building substrates
2005	Adopted for indoor air quality assurance project at Meguro Ward Community Center (municipal guarantee project)	FXN-111-S6 – Applied to building substrates
2006	Designated for Grafton VOC reduction work under sick house countermeasure guidelines (Minato Ward facility renovation)	FXN-111-S6 – Applied to interiors and built-in furniture
2010	Concluded exclusive sales agreement with GRAFTON KOREA Co., Ltd.	Started formaldehyde reduction projects using Grafton agents
2011	National research institute: Radioactive contamination countermeasure gel & spray (Minamisoma area)	Camp-type Grafton gel and LLST odor countermeasure spray
2011	Tokyo Metropolitan Housing Supply Corporation – Formaldehyde reduction	Grafton Cloth (wallpaper) – Applied to ceilings and walls
2012	Sekisui House Co., Ltd.	Grafton Cloth (wallpaper) – Liquid applied to ceilings after wallpaper installation
2012	Shin-Ei Housing Co., Ltd. – Emission countermeasure concept 'Appeal Mansion'	FXN-111-S6R (wallpaper) – Applied to ceilings after wallpaper installation
2013	Sincol Co., Ltd. – Launched SLP Grafton-compatible vinyl wallcoverings	FXN-111-S6R
2013	Mitsui Home Co., Ltd. – Adopted SLP Grafton-compatible vinyl wallcoverings	SLP Grafton-compatible vinyl wallcoverings
2013	China – Received technological innovation award in interior finishing materials sector	FXN-111-S6R
2014	Signed general distribution agreement with Xi'an Vingo Environmental Science and Technology Co., Ltd. (China)	Started formaldehyde reduction projects using Grafton agents
2014	Korea: Samsung Construction apartment project – Standard specification for new formaldehyde regulations	FXN-111-S6R – Urethane film for decorative sheets
2015	Korean Construction Apartment Projects: SK, Hyundai, KCC, Lotte Constructions – Obtained Standard Specifications	FXN-111-S6R – Urethane film for decorative sheets
2016	China General Distributor network expanded to 150 agents nationwide (180 as of May 2017)	Applied to interior finishes and furniture
2017	Signed general distribution agreement with Freshair Industry Sdn Bhd (Malaysia)	Started formaldehyde reduction projects using Grafton agents
2018	Adopted in Chiyoda Co. functional additive gypsum board	Mixed into gypsum slurry
2018	Developed functional additive tobacco filter – Target: Formaldehyde & Acetaldehyde	NUV series (alcohol solvent)
2018	Korean regulation: Passed formaldehyde emission reduction performance test for interior paper	Jell Wall paper – NAMUH sales launch
2019	China General Distributor cumulative projects exceeded 50,000 units	Applied to interiors and furniture
2020	Korea HANSEN Co., Ltd. – HANSEN WALLCOVERINGS obtained standard specification	FXN-111-S7SUC-V
2021	Signed general distribution agreement with Taiwan Maio Healthy Air Company	Started formaldehyde reduction projects using Grafton agents
2022	Developed Antiviral Agent GV – PCT patent application pending	Safe antiviral agent with long-term inactivation effect
2022	China General Distributor supplied to 1,000,000 households over 9 years	Applied to interiors and furniture
2023	Launched formaldehyde removal spray via Douyin (China TikTok)	For Chinese domestic users
2024	Launched Sales of Special Deodorizers LLST-100 / 200 (Corpse Putrid Smell) and LLST-220 (Fire odor)	LLST-100 / LLST-200 / LLST-220
2025	Launched Residential Purification Service by Jyutaku Tokusou Co., Ltd. Using Grafton Special Deodorizers	LLST-100 / LLST-200 / LLST-220

Company Profile

Registered Trademark: GRAFTON (グラフトン)

•Major Public Presentations

- 2000 The Society of Indoor Environment, Japan:
Study on Performance Test Methods for Coating Materials for Indoor Environmental Improvement”
- 2000 Building Environment and Energy Conservation Organization (IBEC):
Full-scale RC structure testing – Reduction test of 38 types of gaseous substances
- 2001 The Society of Indoor Environment, Japan:
Study on Methods for Reducing Formaldehyde in Indoor Environments Using Graft-Polymer Adsorbents”
- 2002 U.S. Environmental Protection Agency – IAQ (Indoor Air Quality) World Conference:
• “Study on Methods for Reducing Formaldehyde in Indoor Environments Using Graft-Polymer Adsorbents”
- 2003 21st Air Cleaning and Contamination Control Conference:
Study on Methods for Reducing Formaldehyde in Indoor Environments Using Graft-Polymer Adsorbent Materials”
- 2004 Architectural Institute of Japan – Academic Presentation:
Removal and Emission Control of VOCs Using Graft-Polymer Coating Materials”
- 2012 The Society of Indoor Environment, Japan:
Research on Formaldehyde-Adsorbing Wallpaper Utilizing Radiation-Induced Graft Polymerization Technology
- 2013 The Society of Indoor Environment, Japan:
Case Study of Multi-Unit Housing Construction Incorporating Formaldehyde Adsorbents with Health Risk Considerations
- 2014 SIAQ (International Society of Indoor Air Quality and Climate)
Indoor Air 2014 in Hong Kong: “Reduction of Indoor Air Concentration of Formaldehyde by Adsorptive Polymer for Preventing Long-Term Exposure Effects in Residences”

Company Profile

Company Name : GRAFTON Co., Ltd.

Representative Director : Taisuke Shindo

Established : May 2002

Head Office : 4-11-14-3F Yoga, Setagaya-ku, Tokyo 158-0097, Japan

Tel: +81-3-6413-4766

Fax: +81-3-6413-4737

Website : www.grafton-gr.com

Capital : JPY 70,000,000

Business Activities :

Research and development of organic polymer materials utilizing radiation irradiation technology

Manufacturing and sales of GRAFTON chemical adsorption materials

Planning, development, and sales of environmental countermeasure products

Affiliated Organization : The Society of Indoor Environment, Japan

<http://www.siej.org/>

Overseas Exclusive Distribution Partners

Exclusive Distributor – Korea (January 14, 2010)

GRAFTON KOREA CO., LTD.

#16869, 2725-3 Yonggu-daero, Suji-gu, Yongin-si, Gyeonggi-do, Republic of Korea

Website: www.grafton.co.kr

Exclusive Sales Distributor – China (October 20, 2014)

XI'AN VINGO ENVIRONMENTAL SCIENCE AND TECHNOLOGY CO., LTD.

Room 1807, B Building, Greenland Linghai Plaza,

No. 1 Jin Ye Road, High-Tech Zone, Xi'an 710065, Shaanxi Province, China

Website: www.iquanfen.com

Exclusive Sales Distributor – Malaysia (June 27, 2017)

Freshair Industry Sdn Bhd

Lot 10478 (D7), Jalan Nenas,

Jalan Kampung Jawa, Batu 5, 42450 Klang, Selangor Darul Ehsan, Malaysia

Website: www.freshome.com.my

Exclusive Sales Distributor – Taiwan (June 29, 2021)

Maio Healthy Air Company Ltd.

No. 250-1, Juguang Road, Wanhua District, Taipei City 108, Taiwan

Website: www.mha-eco.com



GRAFTON Product Development Policy

Grafton Corporation recognizes chemical exposure, including formaldehyde, in residential, educational, and healthcare environments as a critical social issue. Rather than providing temporary removal, we focus on suppressing re-emission and achieving long-term reduction in living environments through our chemical adsorption technology, ensuring safer spaces where people spend extended periods of time.

With particular consideration for sensitive populations, including children, we are committed to developing products that contribute to extending healthy life expectancy. All of our products are designed based on this philosophy.

This technology is designed to immobilize harmful substances at the molecular level and suppress re-emission.

Formaldehyde has been confirmed as a carcinogen, with reported effects on neurodevelopment, allergies, and the respiratory system. Children are considered particularly vulnerable to its effects.

Source: U.S. Environmental Protection Agency (EPA, 2024)

