
행정안전부
대한민국 안전기술대상
대통령상 수상
대한민국 우수특허대상
화학·안전부분 수상
나노기술을 이용한 초미세캡슐 소화기
AEGIS®
초기화재진압
화재예방기술
나노안전기술
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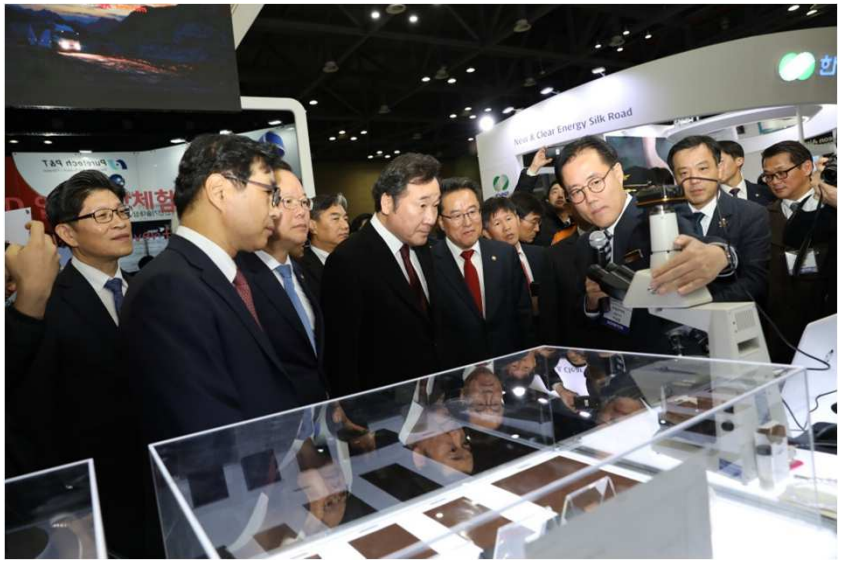
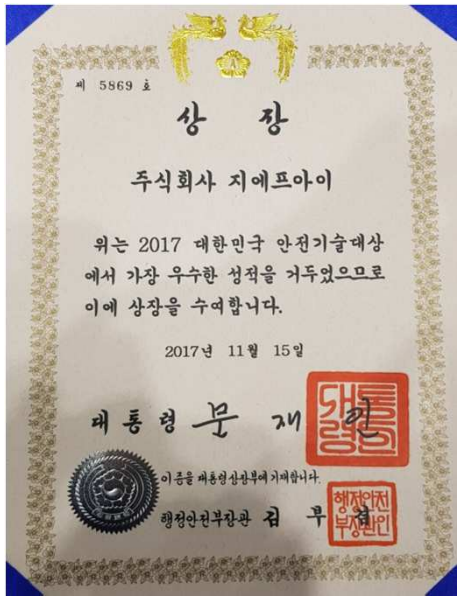
GFI

Awarded the Presidential Prize for 2017 Korea Safety Technology - The Best Safety Technology





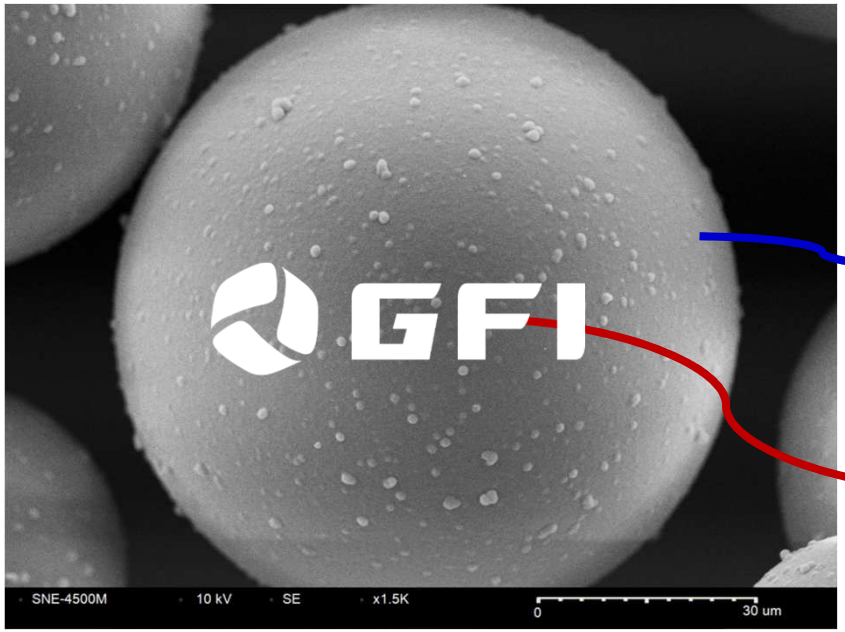
Ⅰ. Background of product development - Necessity of technology

1. Demand New Technology of fire suppression, by advanced fire risk.
2. The need for large-scale fire prevention and early fire suppression
3. Increased blind spot of fire risk
4. Requires automatic fire extinguishing system with excellent workability

II . Technology - Based Technology

- ✓ Fused products of organic, inorganic, polymer chemistry and nanotechnology
- ✓ Developed as a reactant at specific temperature (100 ~ 120 ℃) in case of fire: Self-contained fire suppression system.
- ✓ Composite encapsulation with strength, flexibility and safety
- ✓ CAPSULE Mineral Ingredients Technology that does not damage preserved capsules
- ✓ Implementation of technology to prevent internal material cracks using advanced organic fibers

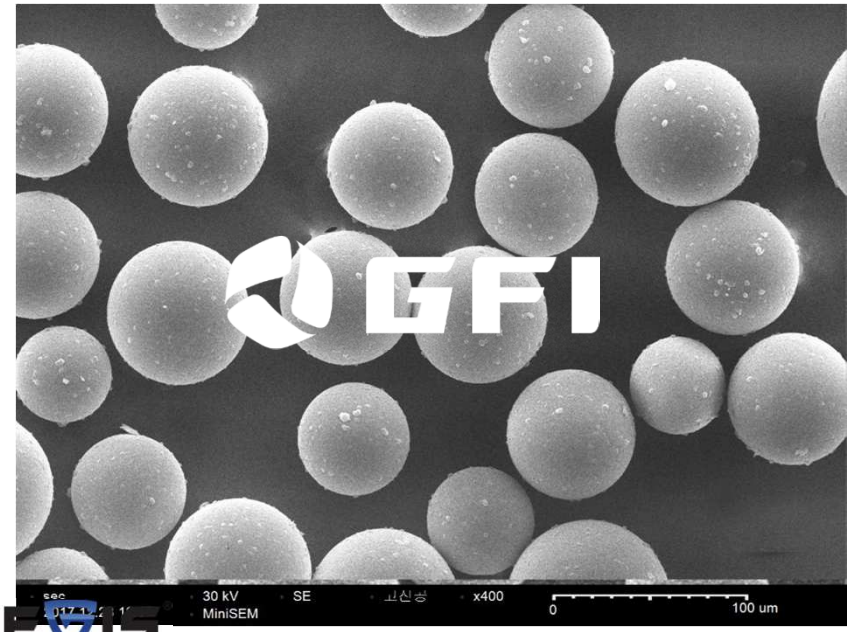
II . Technology - Core Technology

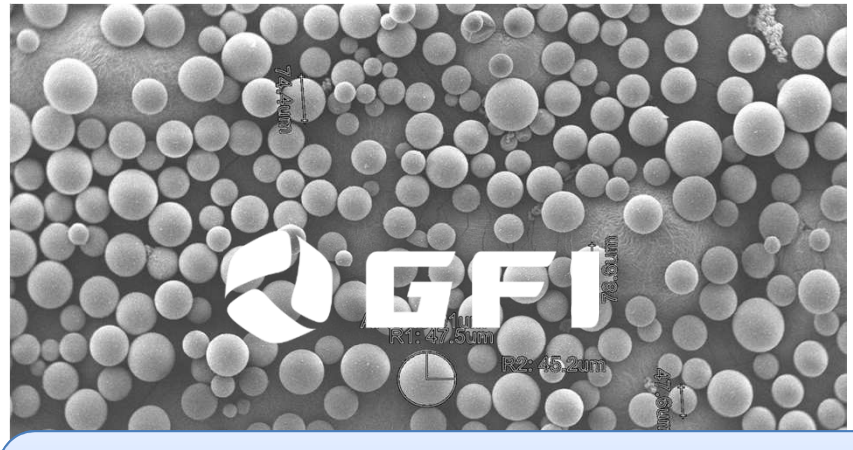


Halogen-based gaseous fire extinguishing agent composition and manufacturing method thereof
Patent Number (제10-1733423호), GFI, 2017

External wall material
New material Highly Polymer
(Enhanced temperature responsiveness, weather-resistance and airtightness)

Internal Core material
Micro-Capsule: Internal clean fire extinguishing agent

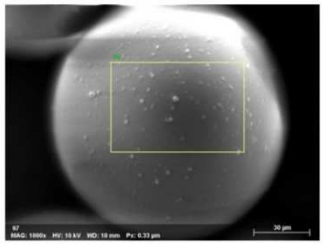




❖ The fire suppression system that could be used in an extreme environment was developed and mass produced by GFI, utilizing the basic technology know-how from military technology.

Application Note
Company / Department

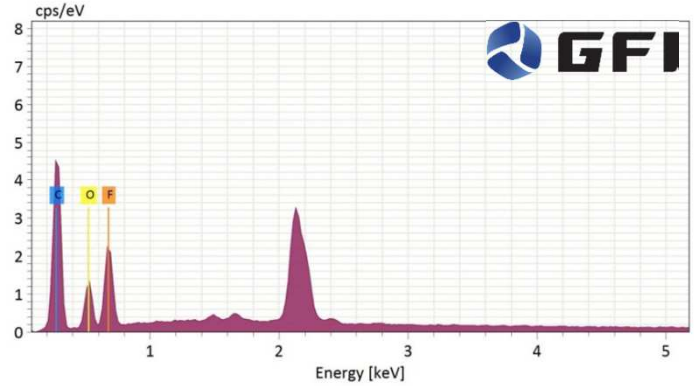
BRUKER



Name	Date	Time	HV [kV]	Mag	WD [mm]
97	2017-08-16	오후 2:24:50	10.0 keV	1000x	10.0 mm

Internal Element Analysis of Capsule

(Energy Dispersive X-ray Spectroscopy, EDS)



89

Element	At. No.	Netto	Mass [%]	Mass Norm. [%]	Atom [%]	abs. error [%] (1 sigma)	rel. error [%] (1 sigma)
Carbon	6	20233	47.66	47.66	57.32	6.13	12.86
Fluorine	9	10698	32.07	32.07	24.38	4.47	13.95
Oxygen	8	5843	20.27	20.27	18.30	3.11	15.36
		Sum	**100.00**	**100.00**	**100.00**		

Date 2017-08-16 Time 오후 2:26:43

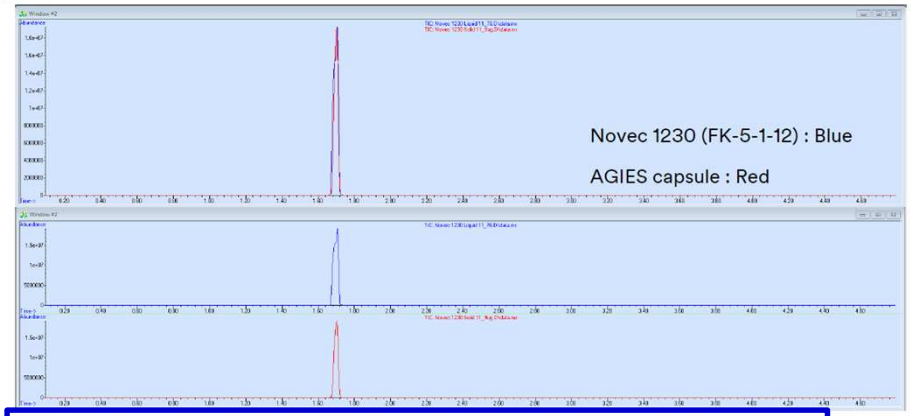
2017-08-16 1. Page

Comparative analysis of Capsule's internal materials

(Head Space – Gas Chromatography, HS-GC)

GFI Capsule analysis report

- Analysis result



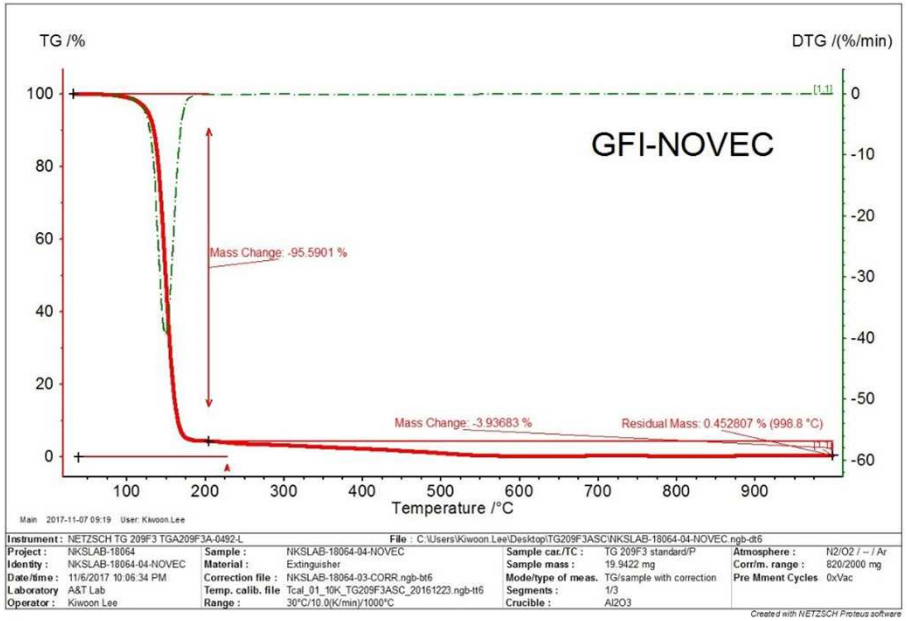
Novec 1230(FK-5-1-12) 와 AGIES의 분석 Peak이 동일하여 같은 물질로 판단됨

3M

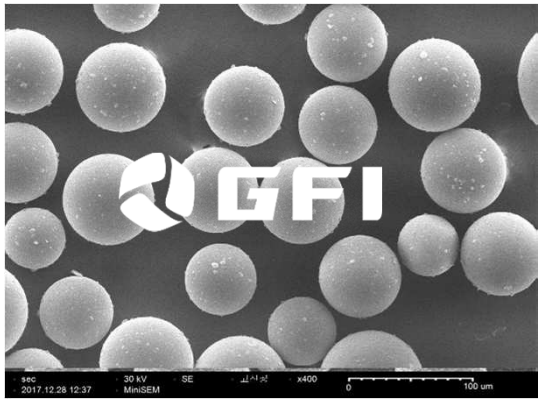
→ Capsule's inner extinguishing agent
: FK-5-1-12 (clean fire extinguish ant)

AEGIS

Capsule's TGA Analysis
(Thermo-gravimetric Analyzer, TGA)

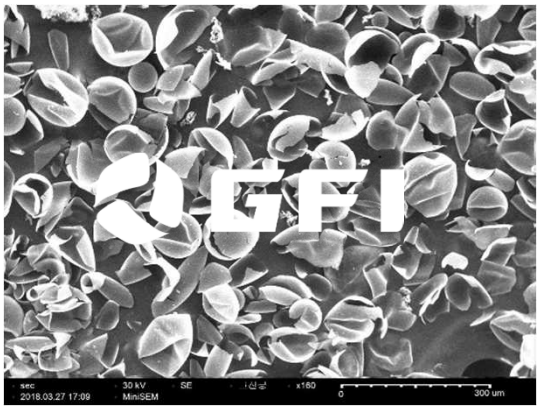


Before



Specific temperature response (100~120℃)

After



❶ Non-Power, Automated Detection System

(Without any additional equipment or installation, AEGIS works by itself.)

❷ Malfunctioning Zero System without Maintenance

(Because do not need the injection equipment, detect sensor, tank for fire extinguish material, The possibility of incorrect operation is cut off. / almost ZERO)

❸ Easy Installation, Ultralight Product

(Can be easily installed in a tight space, without any additional equipment.)
(Easy to move to remove with lightweight product.)

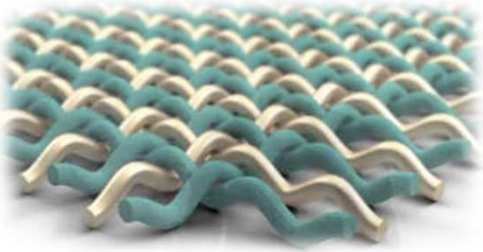
❹ Eco-Friendly Product

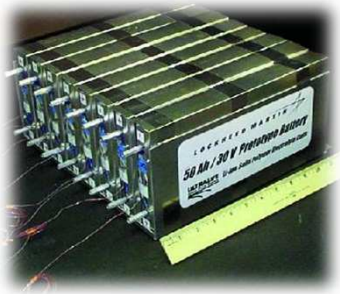
(Only the fire is affected by the fire extinguishing material, adjacent objects are not impacted.)
(ODP, Ozone Depletion Potential: 0.0) (GWP, Global Warming Potential: 1)

❺ Fire Prevention System, Early Fire Suppression Products

(Can be installed close to the fire hazard area and reacts instantly to suppress fire spread. Anti-fire System)

Ⅲ. Product - Application

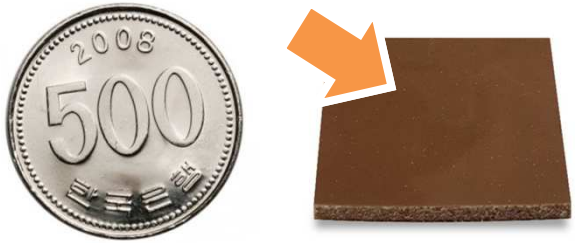




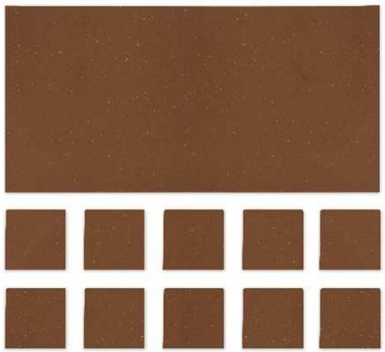
→ **Convergence/integration possible with other industries.**

Ⅲ. Product - Pad Type & Wire Type

No power, Self- contained ,
Miniature fire extinguisher



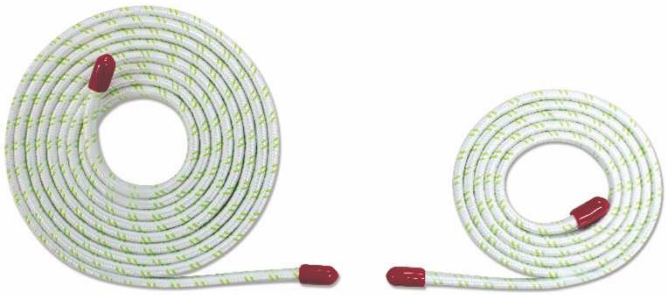
Horizontal, Vertical 3cm, Thickness 3mm

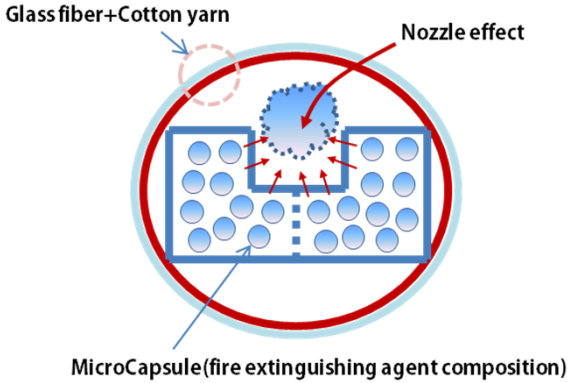


Can be various shape as protective area

Several layers of fire extinguishing agent

Coverage: about 3L(at coin size).





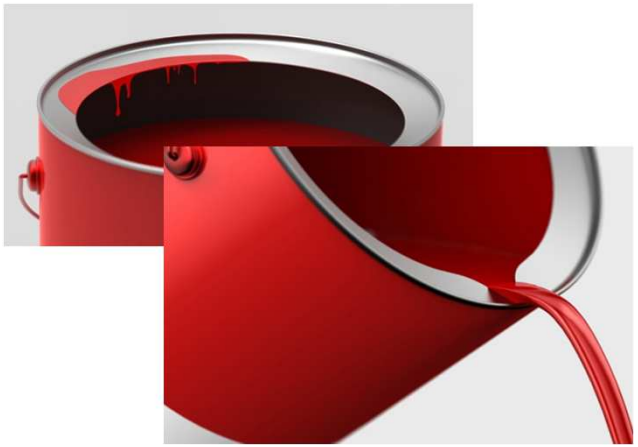
Spray on the fire simultaneously

Capsule's extinguish agent: about 65%

Coverage: about 150L/m

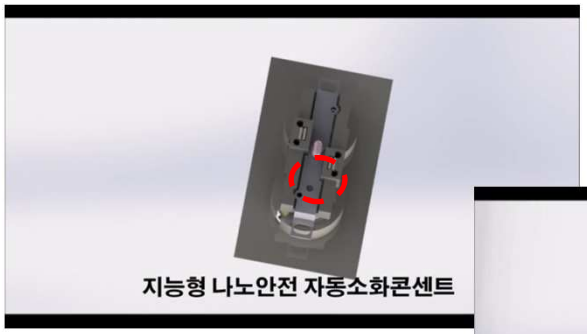
AEGIS SHIELD

- Combines merits of PAD and WIRE Simultaneous injection of capsules - High digestibility
- Suitable for protection of large capacity (over 400L)
- Zero malfunction rate without maintenance

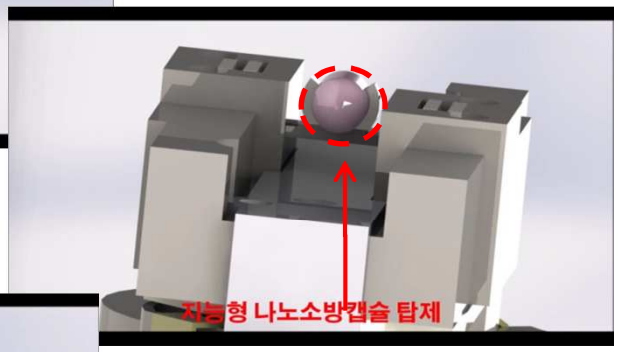


❖ Fire prevent paint R & D in progress

- It is paint, includes microcapsule fire extinguishing agent and applied to various risk factors which are difficult to install fire extinguishing equipment such as building material, ship, automobile, aircraft
- Products that can maximize fire safety by applying directly to fire protection, home appliances, and electric wires of small devices such as smart phones
- Applied as fusion and composite application material in safety field that can be coated on paint



When an electric fire such as an arc occurs in the inside of a socket, the fire extinguishing agent injected into the inside senses and injects fire heat (flame) and automatically cuts off the electric energy power source.



-The microcapsule fire extinguishing agent which is a source material is made into a compact capsule inside the receptacle so that it can be automatically detected when the outlet fires and the safety outlet

-Double-mounted thermal fuses inside the unit automatically shut off the power supply in case of fire. Multiple bending and maximizing the tracking distance are applied.

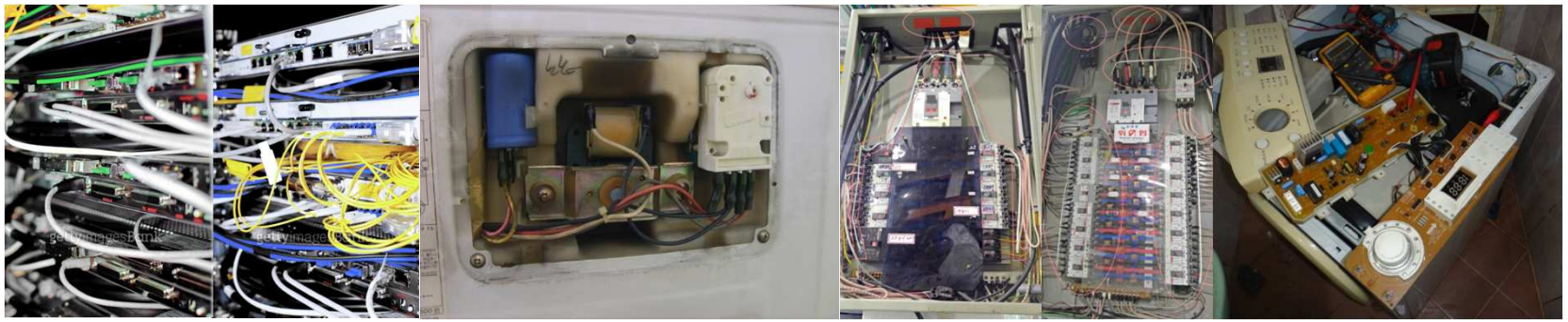
-Expect to enter the legalized standby power outlet market

Ⅲ. Product - Field of Application

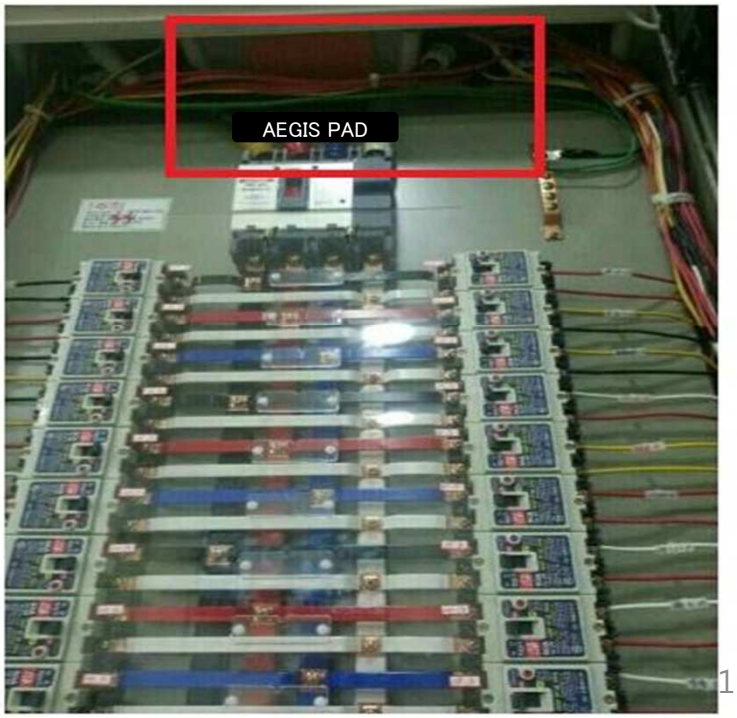
DIVISION	Applicable facilities etc.
House / Apartment	Outlet of general house. Distribution board, switchboard. Old electrical facility.
Underground public places	Public spaces where people gather together such as underground shopping streets / subway history.
Public facilities	Hall, ward office, training center, nursing home, etc.
Hospital / National medical center	Hospitals, nursing homes, etc., which can not be immediately evacuated in the event of a fire.
Hotel	Large-scale, chain hotel →Can be possible Safe Hotel marketing from Fire.
School / Kindergarten	Preventing major disasters such as kindergartens, elementary schools, junior high schools, high schools, universities, and dormitories.
Manufacturing	Manufacturing production sites, offices that use a lot of electricity.
Transportation	Fire prevention facility due to electrical short circuit etc. for Bus. Train ship. Submarine, etc.
KEPCO Installer	Distribution boards and switchboards installed by KEPCO.
Power plant	Internal-external paint area for thermal, hydro, and nuclear power plants.
Solar power plant	Electric collector of solar power plant etc.
Cultural property and Temple facilities etc.	Cultural assets and a nationwide temple facility(*Sungnyemun Gate*'s fire reason: Conventional flame detector, sprinkler, etc. may cause malfunction).
Documentation	Documents made up of paper, such as each local government, the Ministry of National Defense, the National Book, and *the Tripitaka Koreana.*
Server rack	IT facilities that are sensitive to fire such as IT facilities, IDC centers, and server racks.

Switchboards, distribution boards etc. Various public facilities

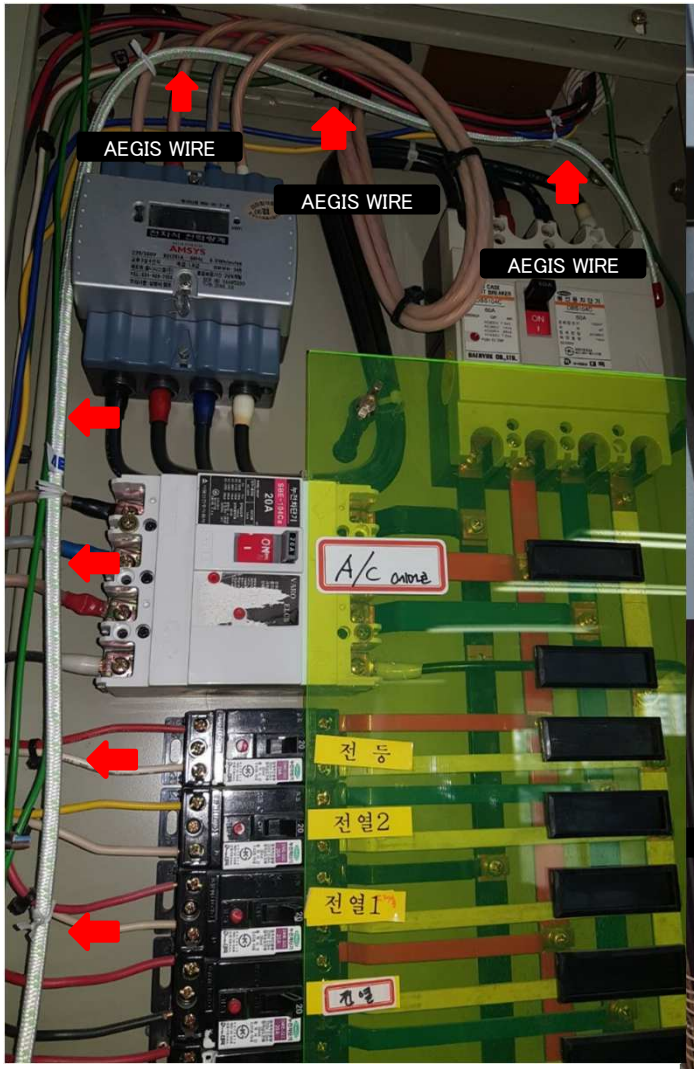
Outlets, communication facilities, electric panels,
temporary facilities and small space electrical facilities

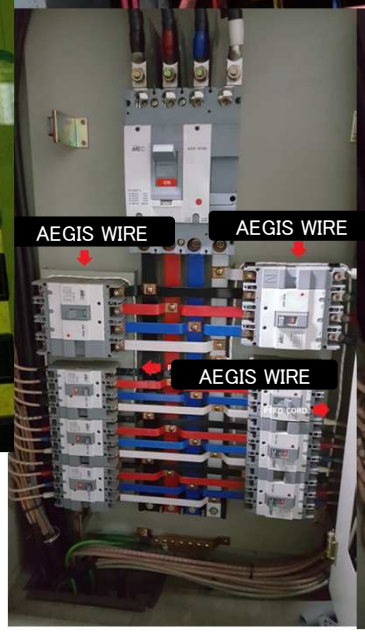


Ⅲ. Product - Installation Samples ❶(AEGIS PAD)

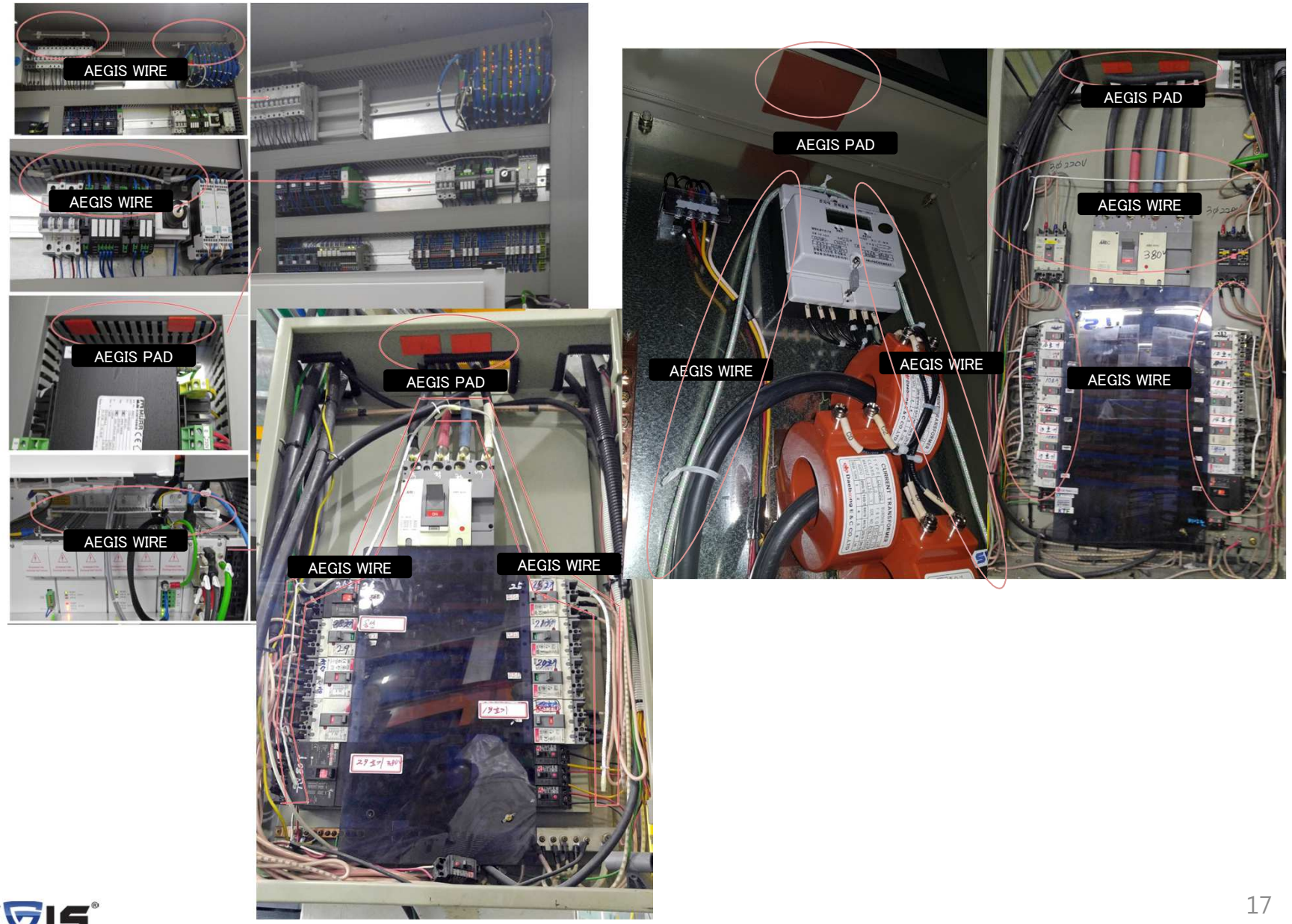


Ⅲ. Product - Installation Samples ❷(AEGIS WIRE)

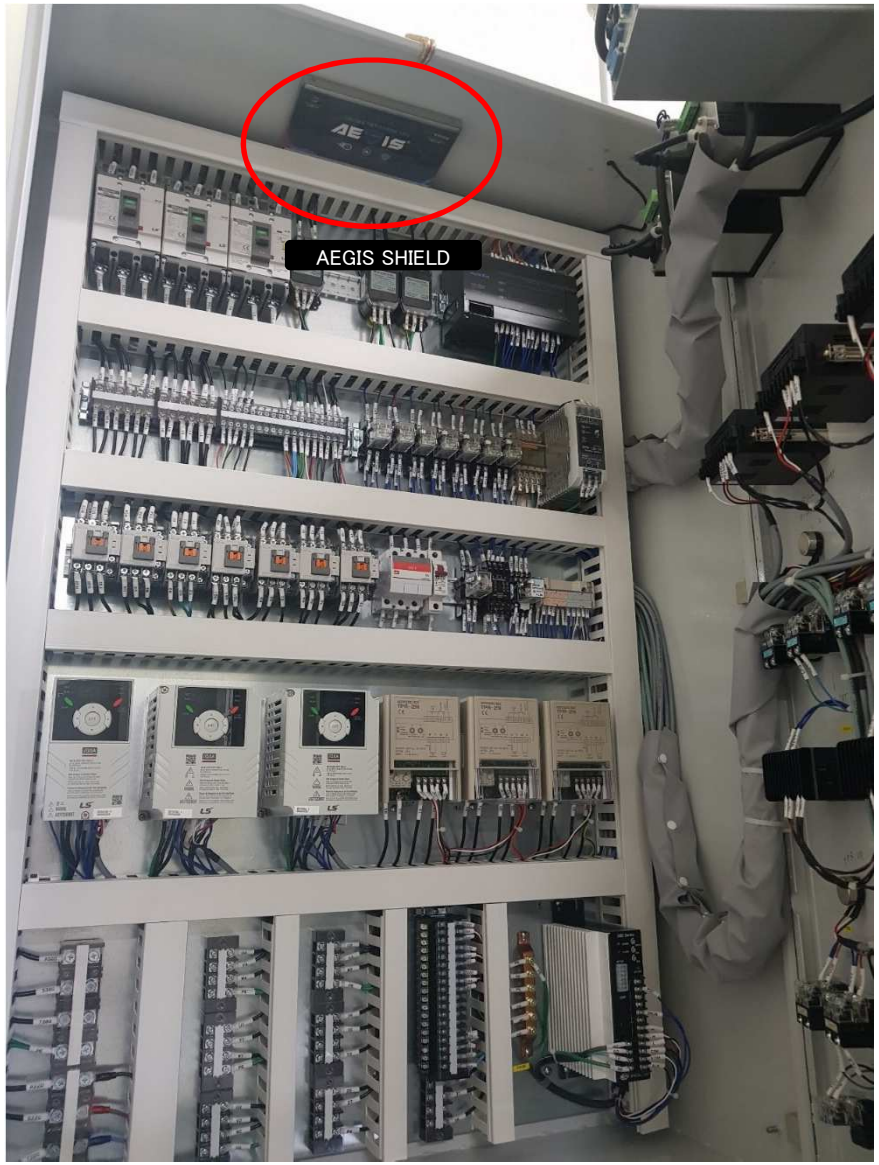


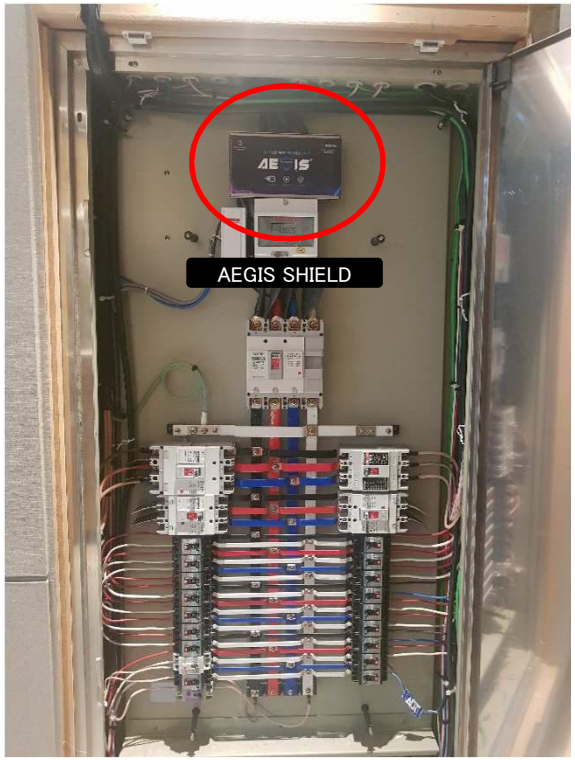


Ⅲ. Product - Installation Samples❸(AEGIS PAD+WIRE)



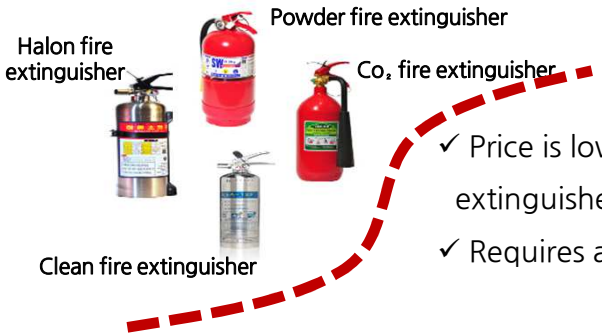
Ⅲ. Product - Installation Samples ❹(AEGIS SHIELD)





Ⅲ. Product - comparison

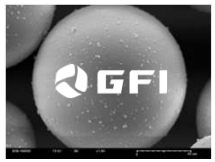
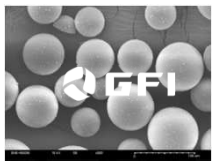
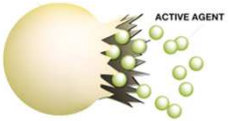
Manual fire extinguishers: For artificial suppression after fire



- ✓ Price is lower than automatic fire extinguisher
- ✓ Requires artificial operation in case of fire

Automatically Protect Hidden Fire Blind Zone, AEGIS Super Microscopic Capsule Fire Extinguisher

Automated fire extinguishing system is required to protect large-scale fires that expand in a flash.

Normal automated fire extinguishing system		Microscopic Capsule AEGIS by Nano-Technology	
	Detecting fire through a separate detector, Systems that have physical and electrical wiring and piping that send signals to devices that are filled with fire extinguishing agents and fire extinguishing agents		Microcapsules detect fire through changes in chemical equilibrium with temperature, An integrated automatic chemical fire extinguisher that injects fire extinguishing agent which is nuclear substance of microcapsule by internal pressure change.
	difficult to detect of various initial fire phenomena, and suppress		Preventing & spreading of the large-scale fire.
	Device aging, frequent malfunction due to environmental changes		Malfunctioning Zero
	Cost of loss due to malfunction		Loss Cost Zero
	Complicated construction such as electric wiring, mechanical equipment, piping		Do not need the additional equipment and tough construction procedure
	Requires a amount of space for installation		Can be easily installed in a tight space
	Some of them contain human harmful substances, environmentally regulated substances		Eco-Friendly fire extinguish ant
	High Price as Complex construction		Price is lower than normal automated fire extinguishing as simple installation.

Ⅳ. Certifications & Patent, Award

Korea fire institute (KFI)
(소구 15-2 & 소구 18-6)

Awarded the Best Prize among of 2017 Korean IP

Awarded the Presidential Prize
for 2017 Korea Safety Technology

GFI's Patent (Technology Etc.)

V . Customers

Manufacturing

SAMSUNG 삼성물산 | SAMSUNG 삼성SDI | SK hynix | SK 건설 | LG화학

posco 포스코건설 | 포스코 posco | KCC | GS 건설 | Interflex

현대산업개발 | HYUNDAI | 한일시멘트 | LOTTE

Government

KOEN 한국남동발전 | 한국남부발전 | KEPCO 한국전력공사 | 강원랜드 세계를 비빈다 | iam과천 Innovation Active Mind

SBC 중소기업진흥공단 Small & medium Business Corporation

→ 삼성 반도체 및 발전 본부 외 약 100개사 납품 및 영업 중.

VI. Product Specification

Product Item	Size (mm)	Weight (g)	Storage Temp. (℃)	Working Temp. (℃)
AEGIS PAD S	30 X 30 X 3 (10EA/1pack)	3.0 g	-40 ℃ ~ 80 ℃	120 ℃
AEGIS PAD L	200 X 100 X 3	54 g		120 ℃
AEGIS WIRE	1000 X 6 X 4	30 g		220 ℃
AEGIS SHIEDL	195 X 100 X 10	220g±15g		120 ℃~ (Immediate reaction in real contact)

AEGIS®

Warranty: 60 months after installation

The specifications of the product may be changed according to the circumstances of the manufacturer.

THANK YOU