

Anti-Flame Propagation Agent (AFPA)

—anti-fire/anti-heat coating—

A breakthrough in nanotechnology
(beyond the conventional phosphorus or aluminum hydroxide “fire-retardants”)
(and different from “silica aerogel”)

(the Conventional Approach) Clay/Phosphorous for Flame Retardant and Anti-Flame (JJ Lin ~2016)

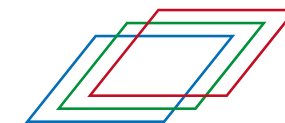
US Patents:

1. PHOSPHOROUS FLAME RETARDANT AND APPLICATION THEREOF TO POLYMER (US 8 487 043 B2, 2013)
(HCP-Jeffamine amine/clay 組成/製程)
2. PHOSPHOROUS FLAME RETARDANT AND APPLICATION THEREOF TO POLYMER (US 8 455 594 B2, 2013)
(HCP-Jeffamine amine/clay 組成/製程)
3. ANTI-FLAME FILM AND METHOD FOR PRODUCING THE SAME (US 2012/0171449 A1) (filed) (NSP film)*

TW Patents:

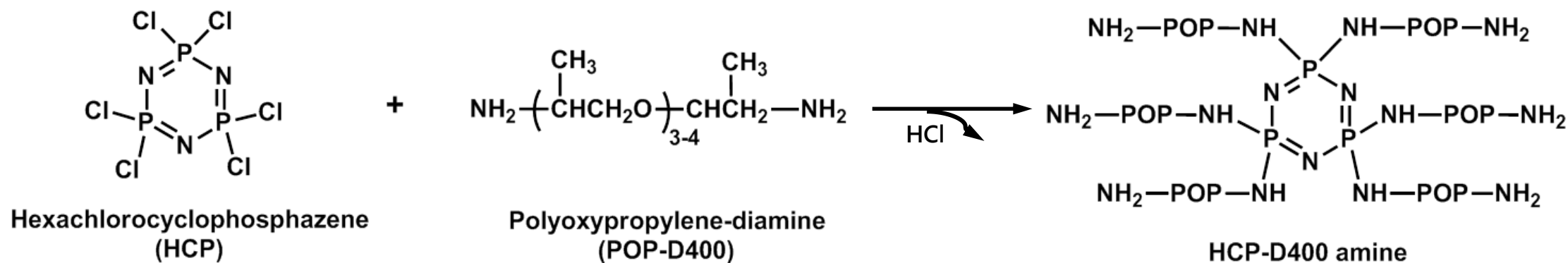
1. 聚醚胺磷系難燃劑及其高分子材料之應用 (TW I408155, 2013) (HCP-Jeffamine amine/clay 組成/製程)
2. 含黏土之聚醚胺磷系耐燃劑 (TW I456000, 2014) (HCP-Jeffamine amine/clay 組成/Anti-flame/UV)
3. 製造磷系奈米矽片阻燃劑之方法 (TW I452062, 2014) (HCP-Jeffamine amine/NSP 組成/製程)
4. 阻焰薄膜及其製備方法 (TW I448542, 2014) (NSP film) *

(the Conventional Approach) Synthesis of HCP-D400 Amine



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- 美國專利：US 8,487,043(130), US 8,455,594 (131)
- Chen, Y. M., Liao, Y. L. & Lin, J. J., J. Colloid Interf. Sci. 2010, 343, 209–16.



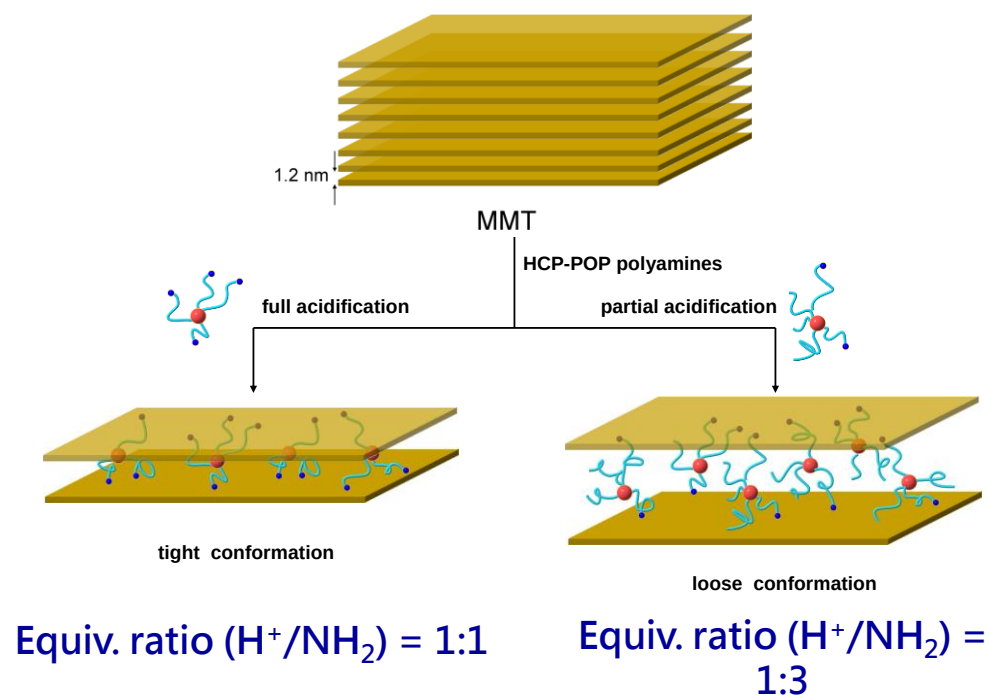
HCP-D400
(viscous, light yellow)

HCP/POP-amine (molar ratio =1/6)	Amine titration (mequiv/g)		Mw (g/mol)	PDI
	Found	Calc.		
HCP-D400	1.38	2.37	1700	2.49

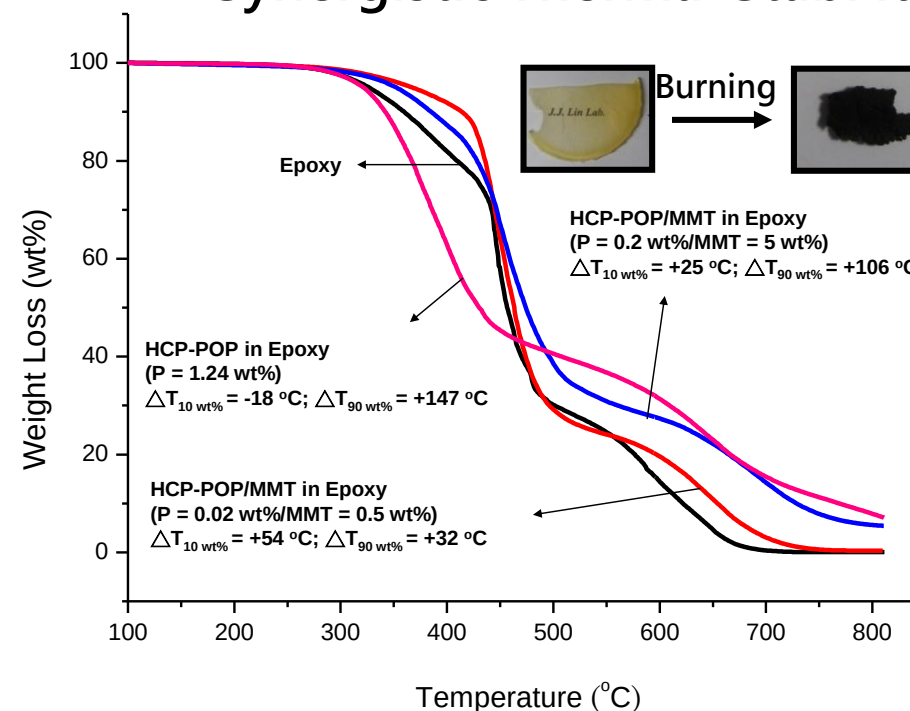
(the Conventional Approach)

HCP-D400 Polyamine Intercalation HCP-D400/MMT

- 美國專利：US 8,487,043(130), US 8,455,594(131)
- 中華民國專利 I408155，聚醚胺磷系難燃劑及其高分子材料之應用
- Chen YM, Liao YL & Lin JJ, J. Colloid Interf. Sci. 2010, 343, 209.



Synergistic Thermal Stability



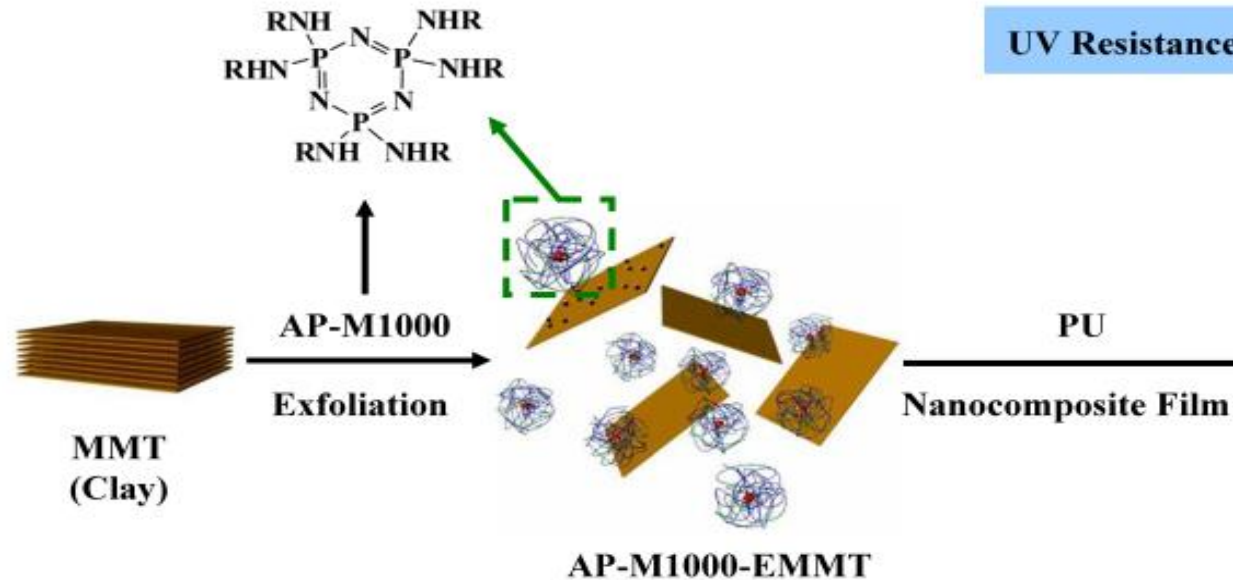
(the Conventional Approach)

HCP-POA (六聚氰胺/矽片混成材料)

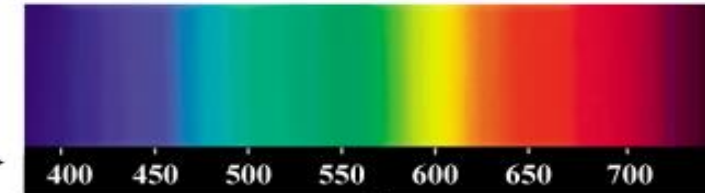
耐燃性/UV Resistant

- 中華民國專利 第I456000號，含黏土之聚醚胺磷系耐燃劑
- Huang TK, Wang YC, Hsieh KH & Lin JJ. Polymer, 2012, 53, 4060.

Aminophosphazenes (AP-M1000): R = Poly(oxyalkylene)



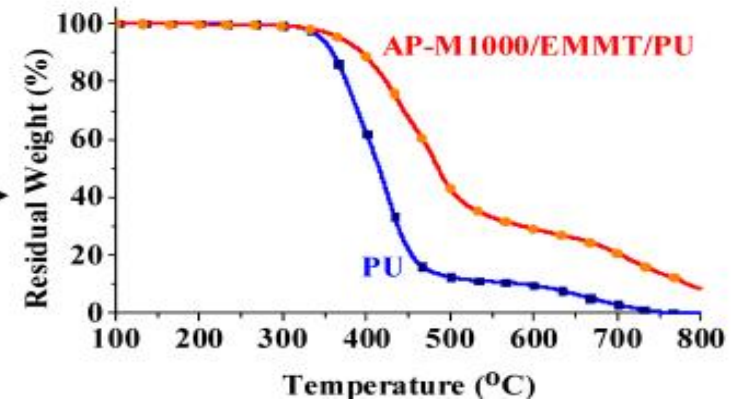
UV Resistance



365 to 400 nm

Film Type	Initial	24 hr	48 hr	72 hr
PU				
AP-M1000/EMMT/PU				

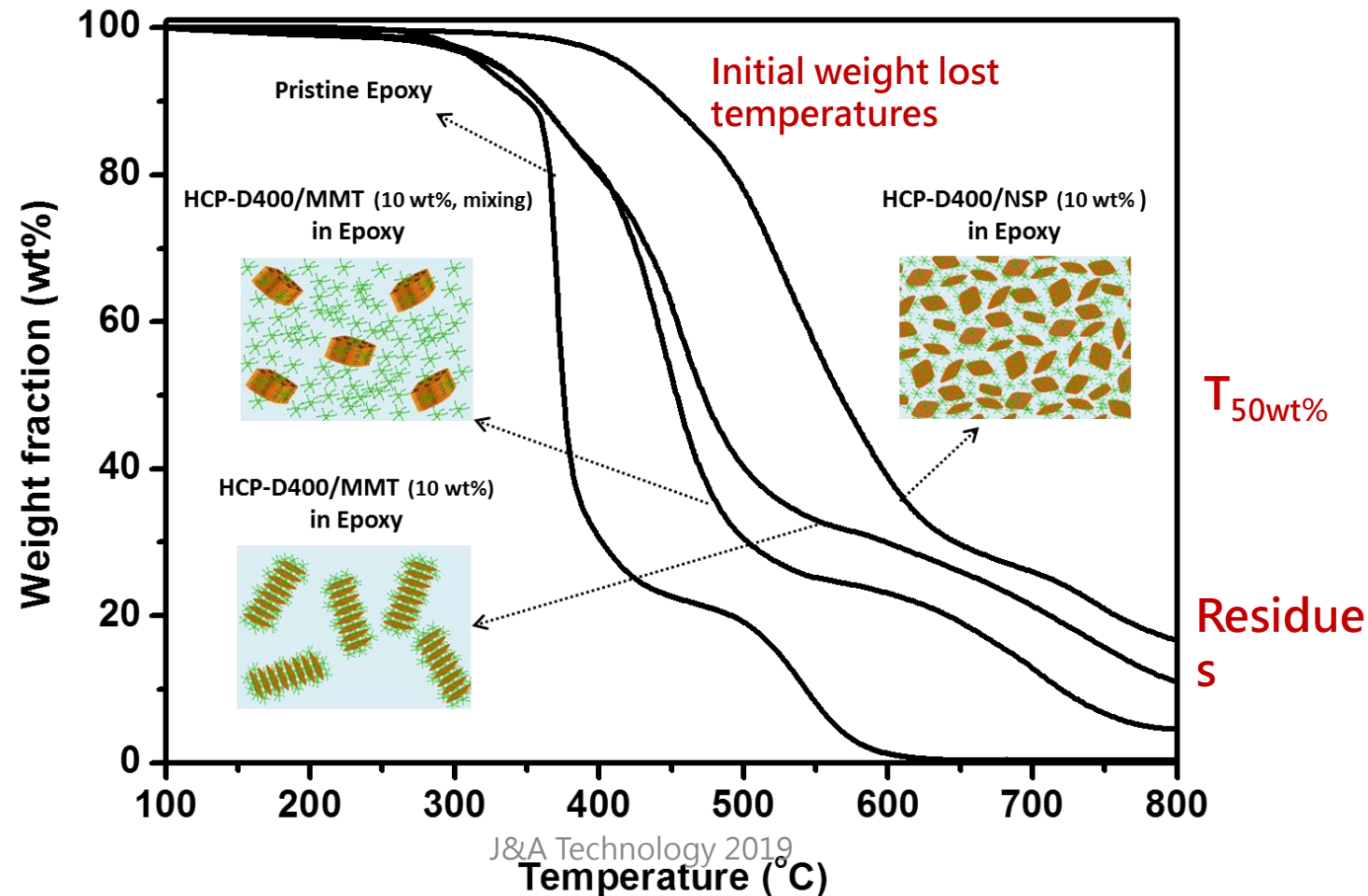
Thermal stability



(the Conventional Approach)

聚醚胺磷系難燃劑及其於高分子材料之應用

- 中華民國專利 I452062，製造磷系奈米矽片阻燃劑之方法
- 申請號100148407，含脫層黏土之環三磷腈系複合體
- Chiou JY, Huang TK, Hsieh KH & Lin JJ J. Polym. Res., 2014, 21, 467.

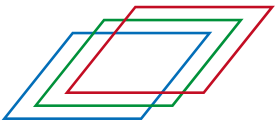


Anti-Flame Propagation Agent (AFPA)

—anti-fire/anti-heat coating—

(New Approach)

阻焰耐燃塗料 (NSP-Melamine)

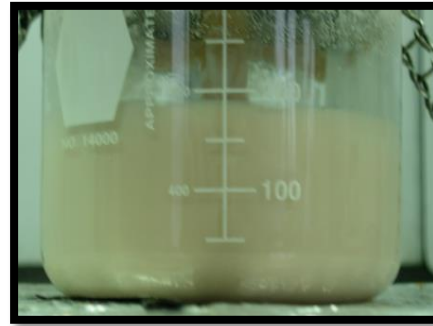


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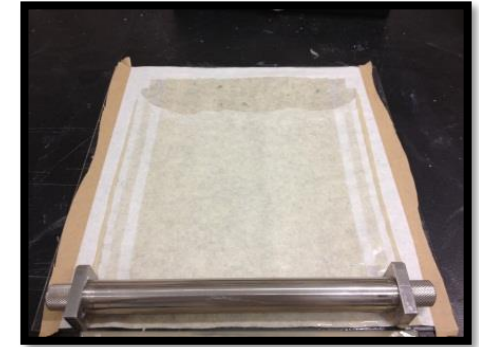
AFPA™ 粉末

H₂O

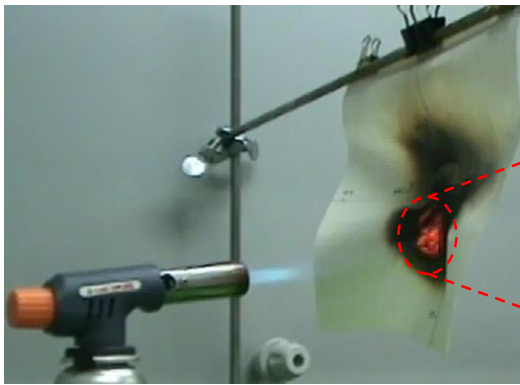


AFPA™ 分散液

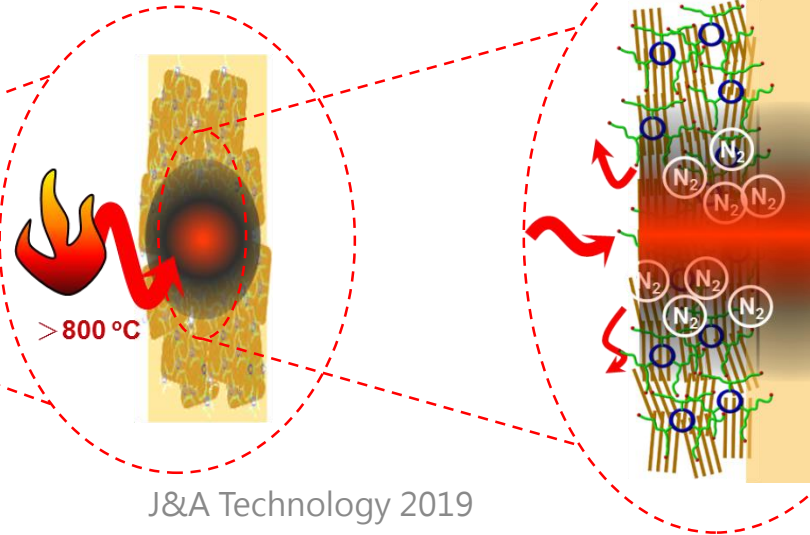
Coating



AFPA™ 膜於牛皮紙



塗佈AFPA™ 於牛皮紙表面
10 μm/ 60 μm



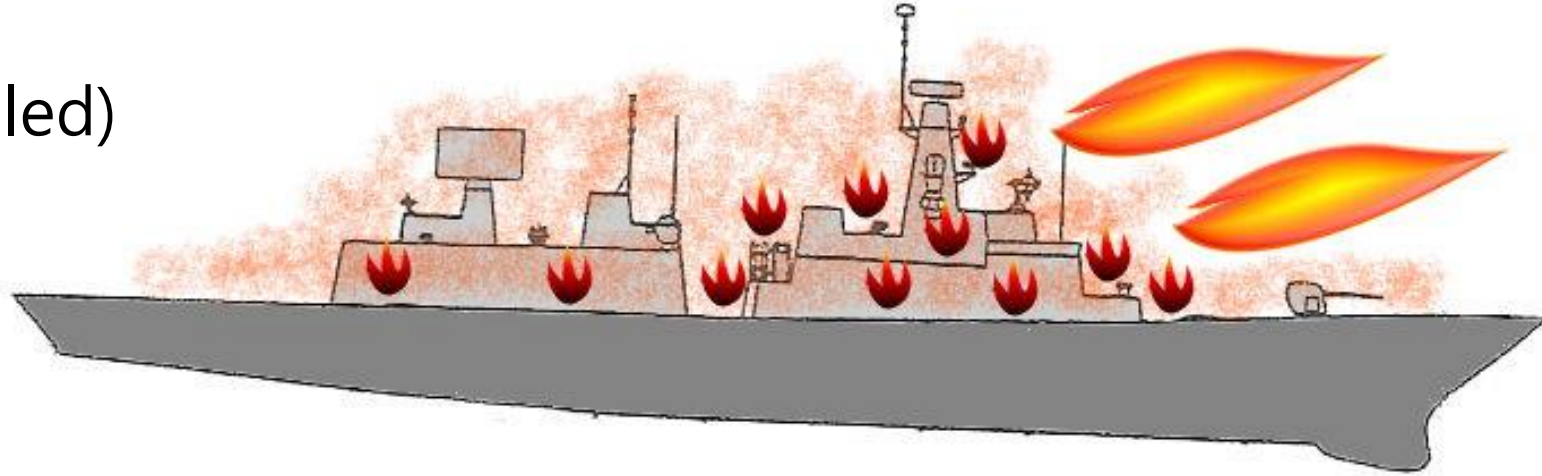
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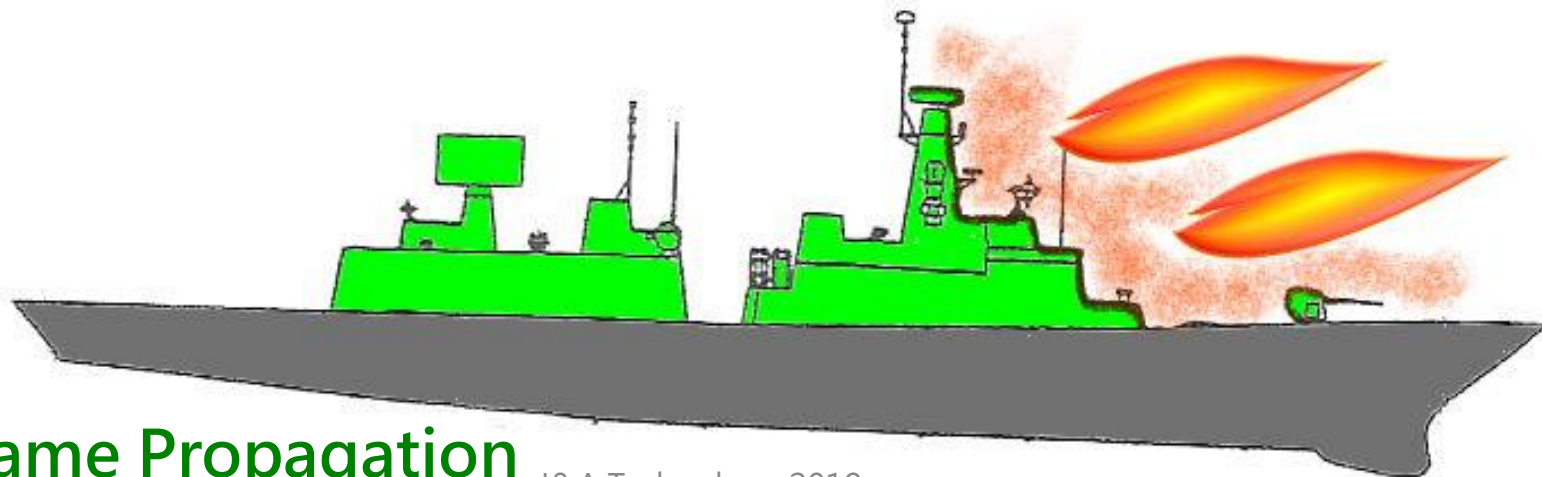
表面未塗佈之牛皮紙

Anti-flame Propagation (conceptual illustration)

(a) (controlled)



(b) coating (60 micrometer thickness of NSP)

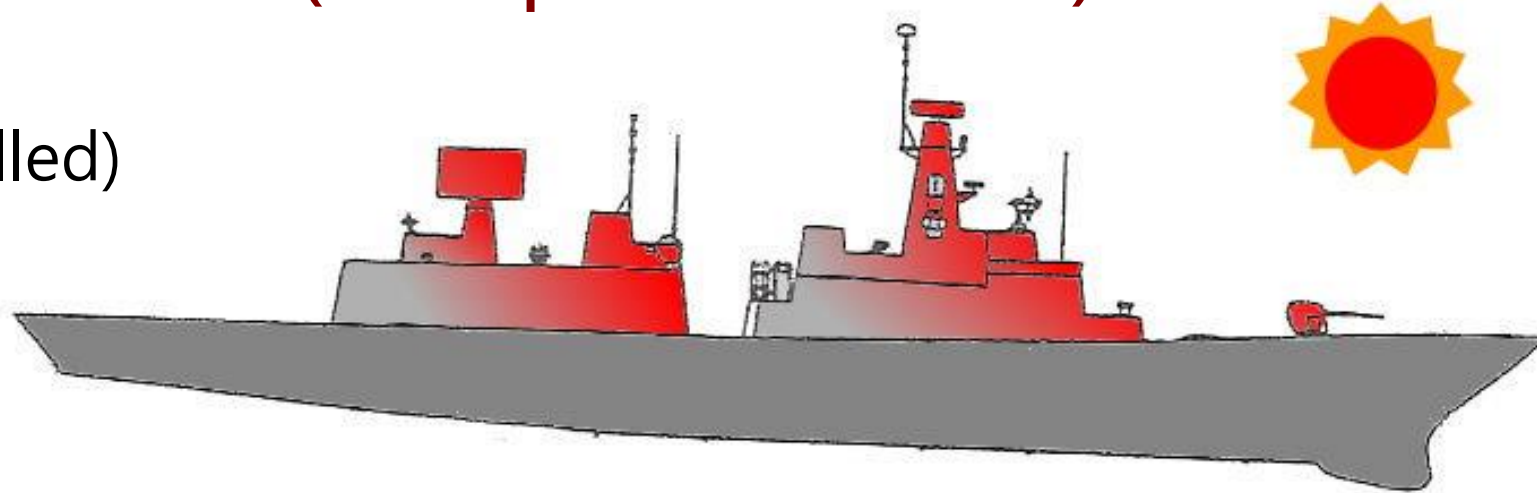


Video: Anti-Flame Propagation

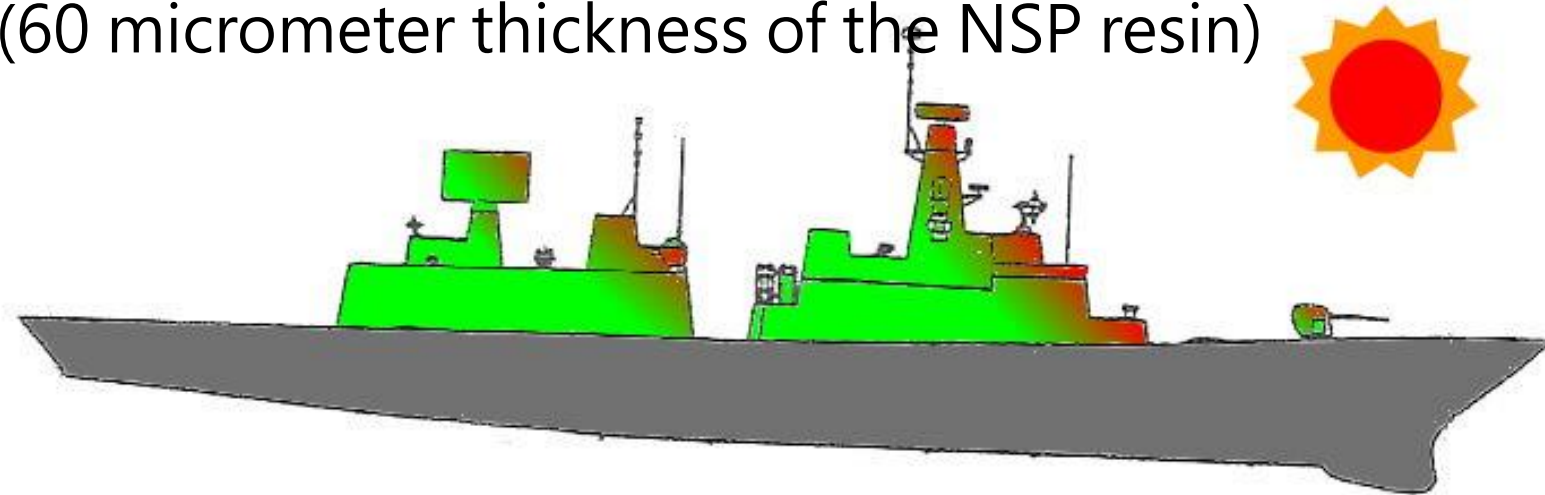
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Anti-heat Transfer (conceptual illustration)

(a) (controlled)



(b) coating (60 micrometer thickness of the NSP resin)



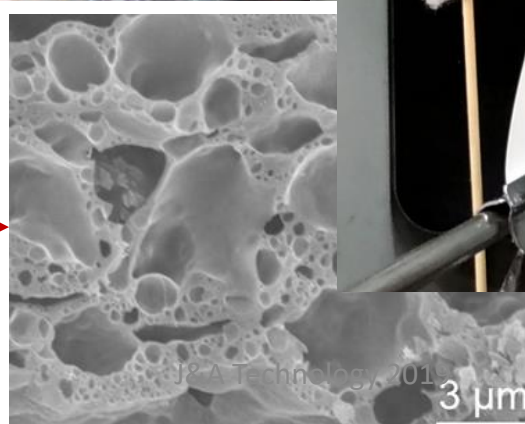
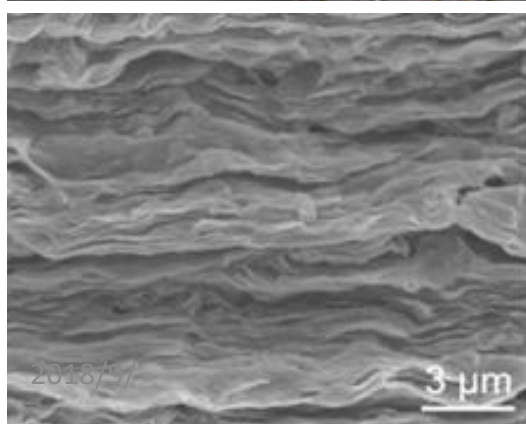
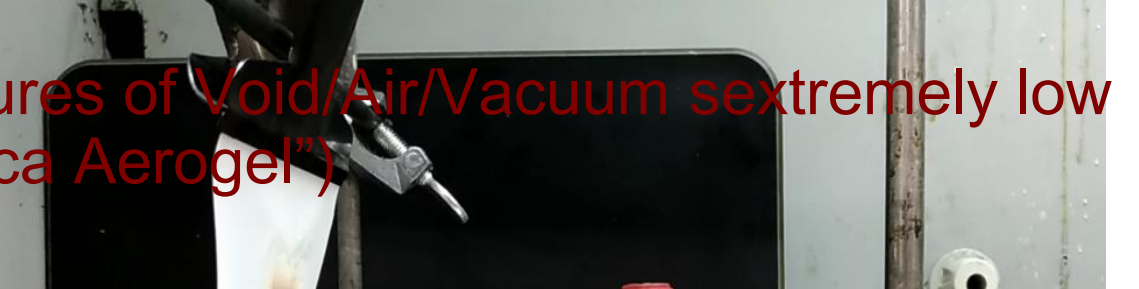
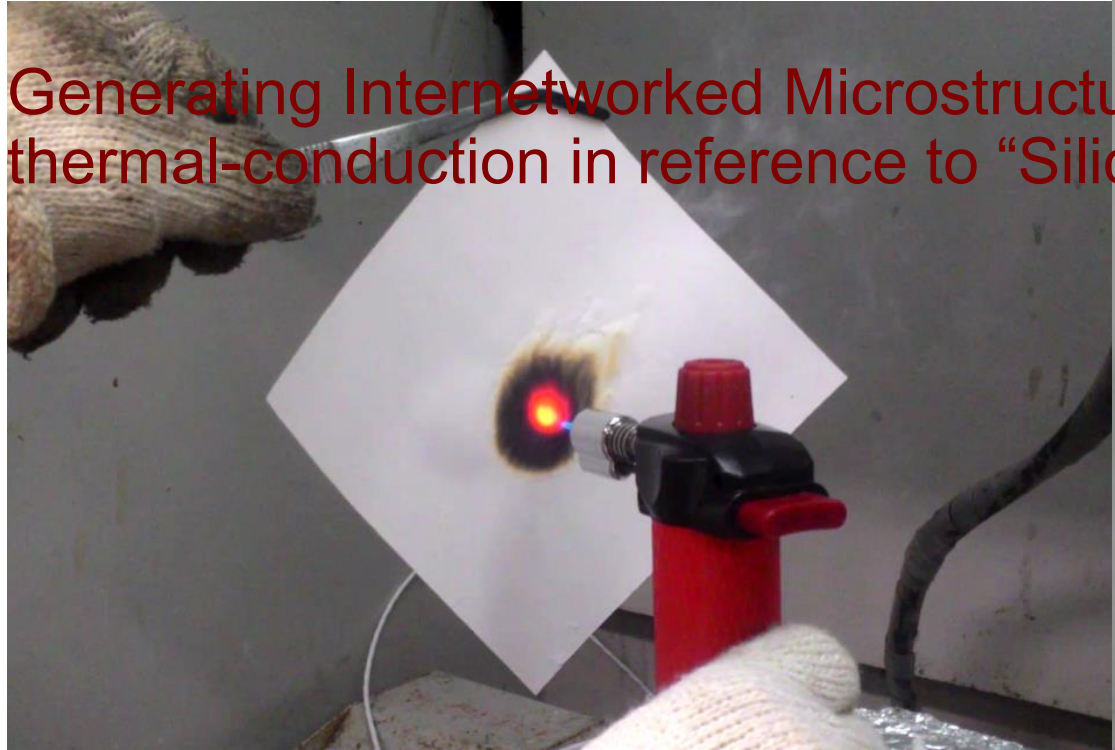
Heat-Shielding Protection (from heat conduction)

Generating Internetworked Microstructures of Void/Air/Vacuum (extremely low thermal-conduction in reference to “Silica Aerogel”)

1,000 °C — 1,300 °C

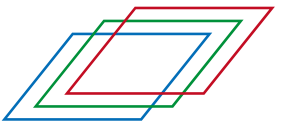
1,000 °C — 1,300 °C

Generating Internetworked Microstructures of Void/Air/Vacuum extremely low thermal-conduction in reference to “Silica Aerogel”

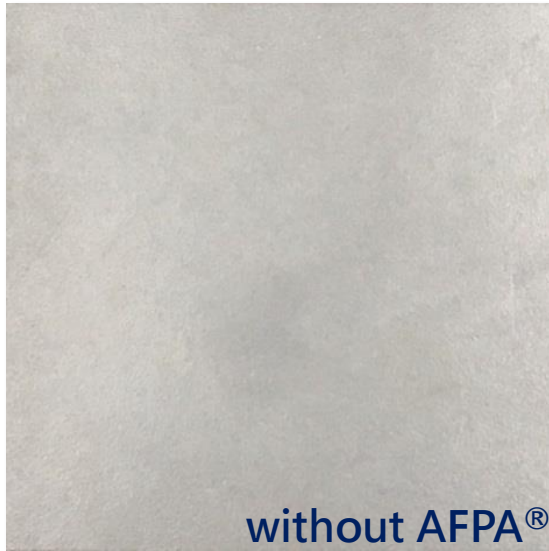


D3806
E662
E84

AFPA™ PET



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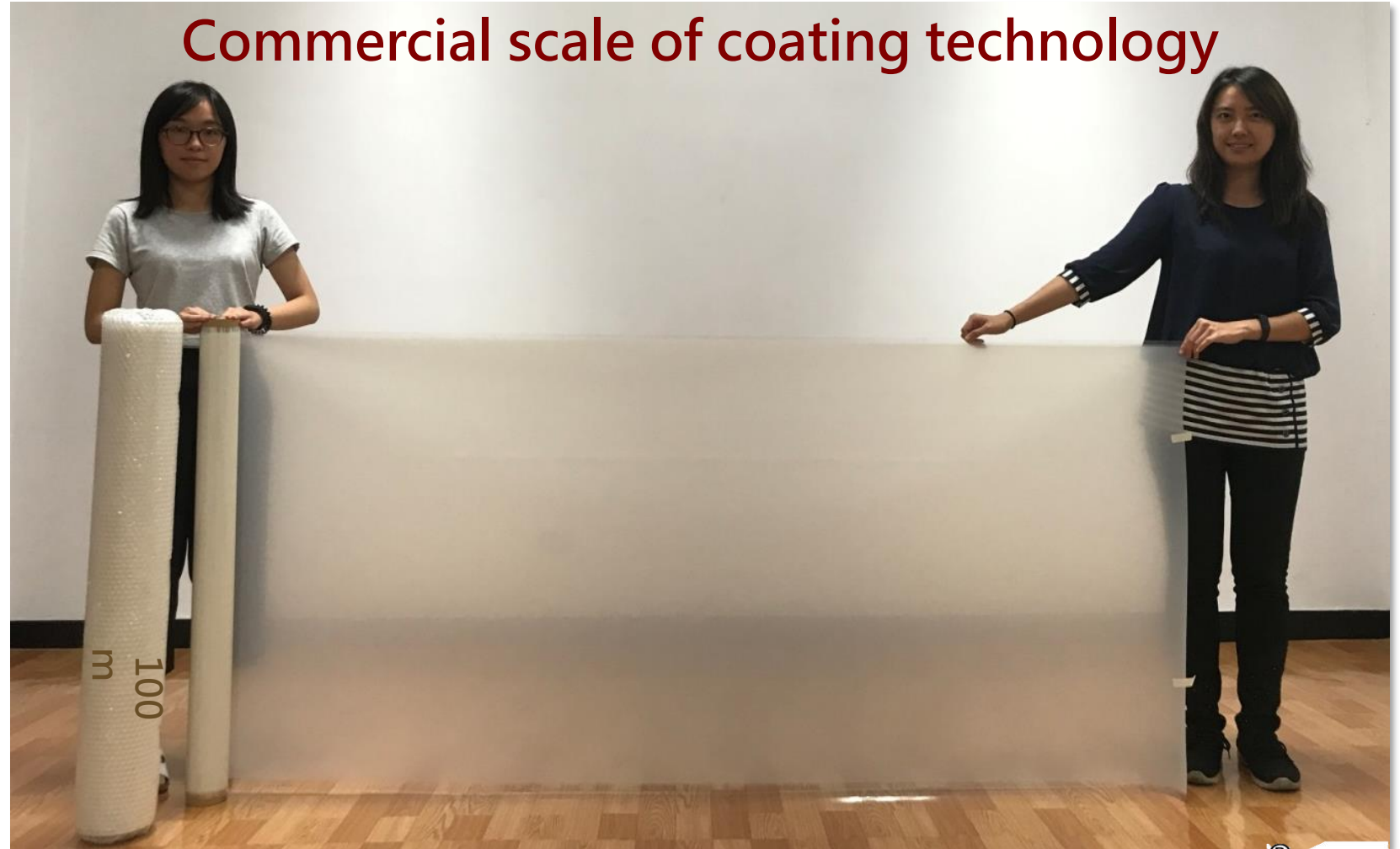
without AFPA®



with AFPA®

2018/9/

Commercial scale of coating technology

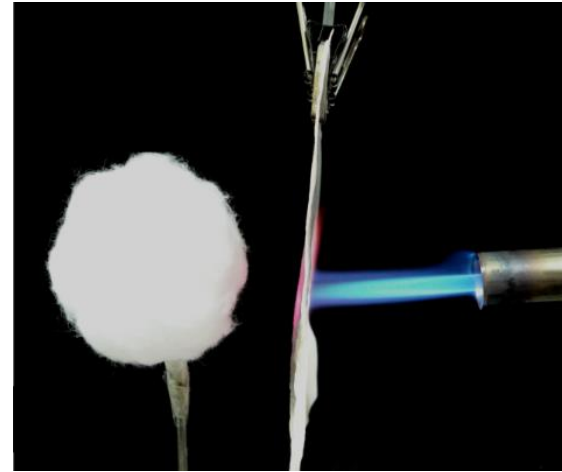


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AFPA™ PET



Video: Anti-Flame Propagation

Will be provided by sending request to Tel. 04-2285-6293 or
Email: jjlinoffice@gmail.com

Video: Anti-Heat Propagation

抗火焰劑 (AFPA™)-應用

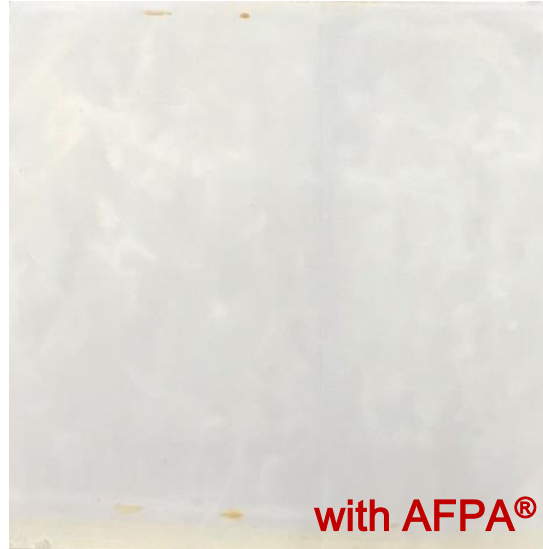
— 讓火焰不傳播 —



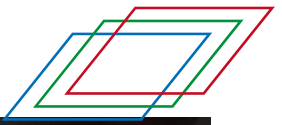
【anti-flame propagation technology】

1. 仿木建材 (發泡PU foam, SBS wood...) 參展Demo影片4.mp4
2. 窗簾/紡織布 (Nylon/PET clothes)
3. 皮革 (leather), 沙發 (sofa)...
4. 塑膠/軟板 PET film
5. PP膜/板材 building materials
6. 塑膠塊材/ 結構(酚醛 phenolic)
7. 鋼筋(阻熱傳) steel
8. 電線/電纜 electric wires and cables
9. 多功能水性塗料(防火/耐熱/耐寒凍/吸附甲醛/抗菌/防黴/抗腐蝕...)
10. Others

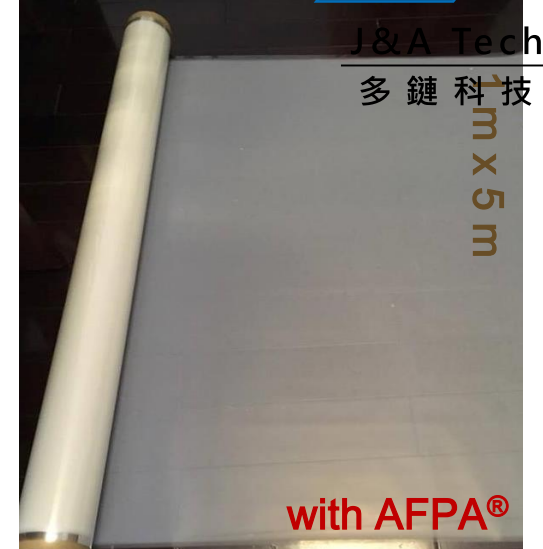
Nylon



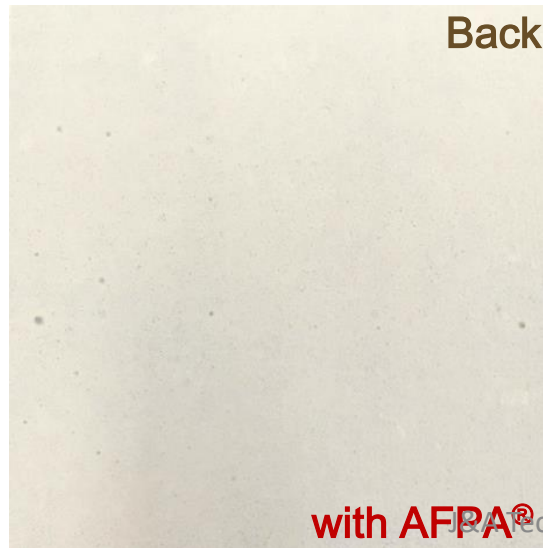
PET Film



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Artificial Leather



Artificial Wood



Anti-microbial, Antifouling, Anticorrosive and Water Repellent Ship-Hull Coating



Current Technology: organic Tin (Sn) or copper-compound coating

New compositions: Non-fluorinated resin and free of toxic Sn or Cu compounds)
by our proprietary NSP nanotechnology

防污/抗菌/防蝕 多功能塗料
可取代傳統使用含有有機錫/銅化合物之塗料

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J&A Technology Corporation

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