

“**elk®**”

**New Polyester Fibrous Foam
To replace Foamed Polyurethane**



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The Teijin Group Organization



Polyester Fibers Business Group



High Performance Fibers Business Group



Films Business Group



Plastics Business Group

Medical & Pharmaceuticals Business Group



Fiber Products Marketing Business Group



New Business Development Group

IT Business Group

elk® innovative fibrous foam for the train seats

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Background of the elk[®] development

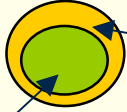
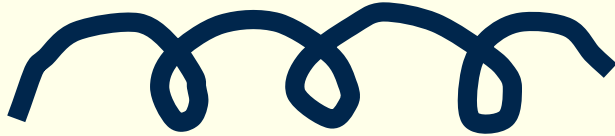
		Polyurethane foam	Requirements for elk [®]
Cushioning		Good	Good
Durability		Good	Good
Weight	Energy conservation problem	Heavy	Over 20% Lighter than PU foam
Comfort	Stuffy	No good (Non-breathable)	Good (Breathable)
Toxic gas	Vehicle fire problem	HCN, CO, CO ₂	CO, CO ₂
Recyclability		NO	OK

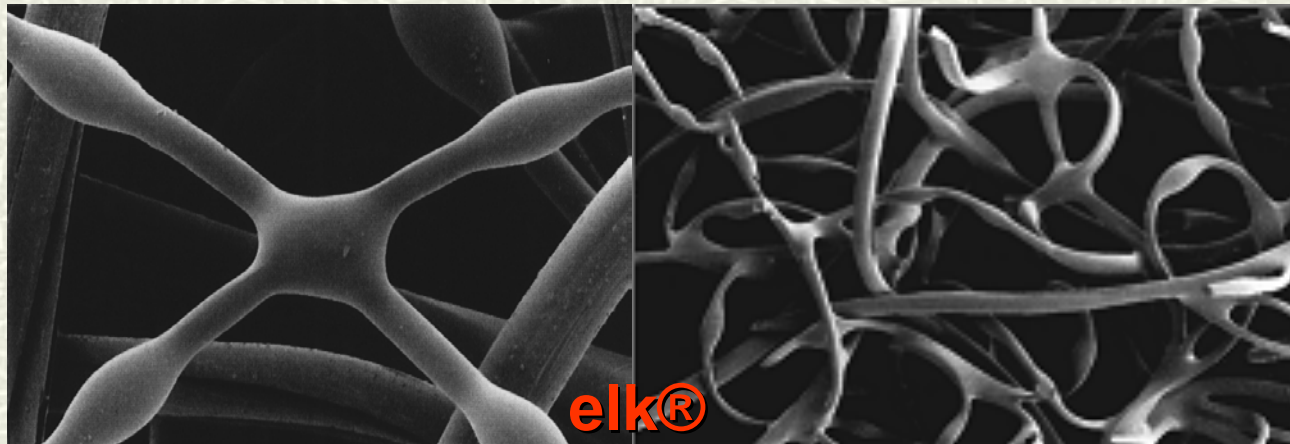
What's **elk**®

PAT NO. JAPAN:2548477

USA:07/809524

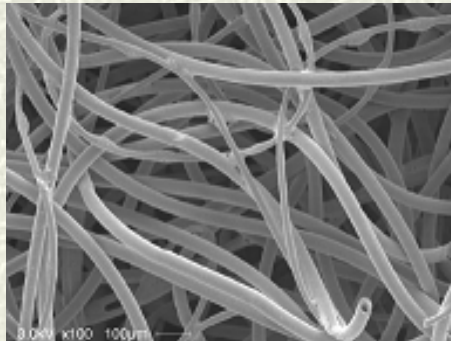
EU:0483386A1

	Special Binder fiber for elk ®	Matrix fiber (Polyester)
Design	Amebic Structure binding point	Tangle Spring Structure
Figure	<p><u>Cross-section of fiber</u></p>  <p>Polyester Elastomer</p> <p>Polyester</p>	<p><u>Side view of fiber</u></p> 
	Tough and flexible bonding point	Dispersion of load

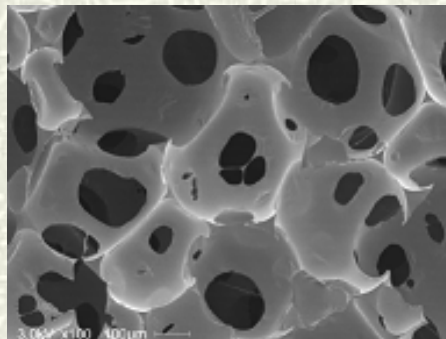


Characteristics of elk®

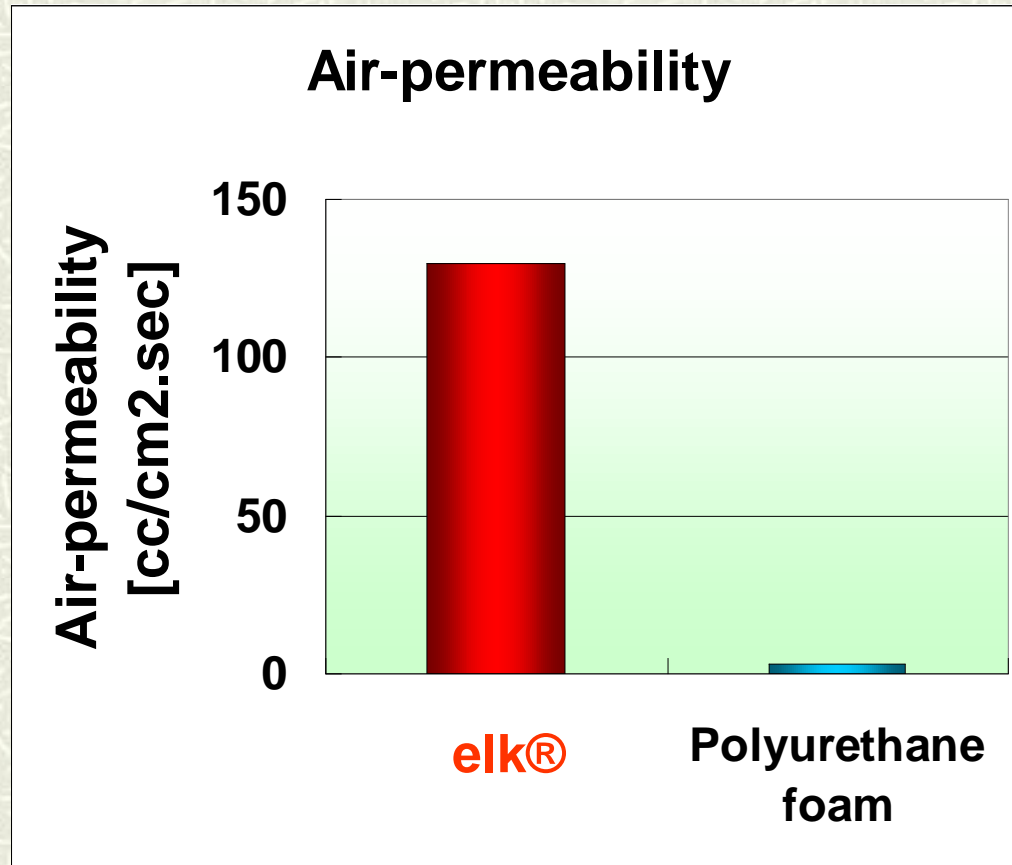
Comfort: No accumulate sweat vapor



elk®

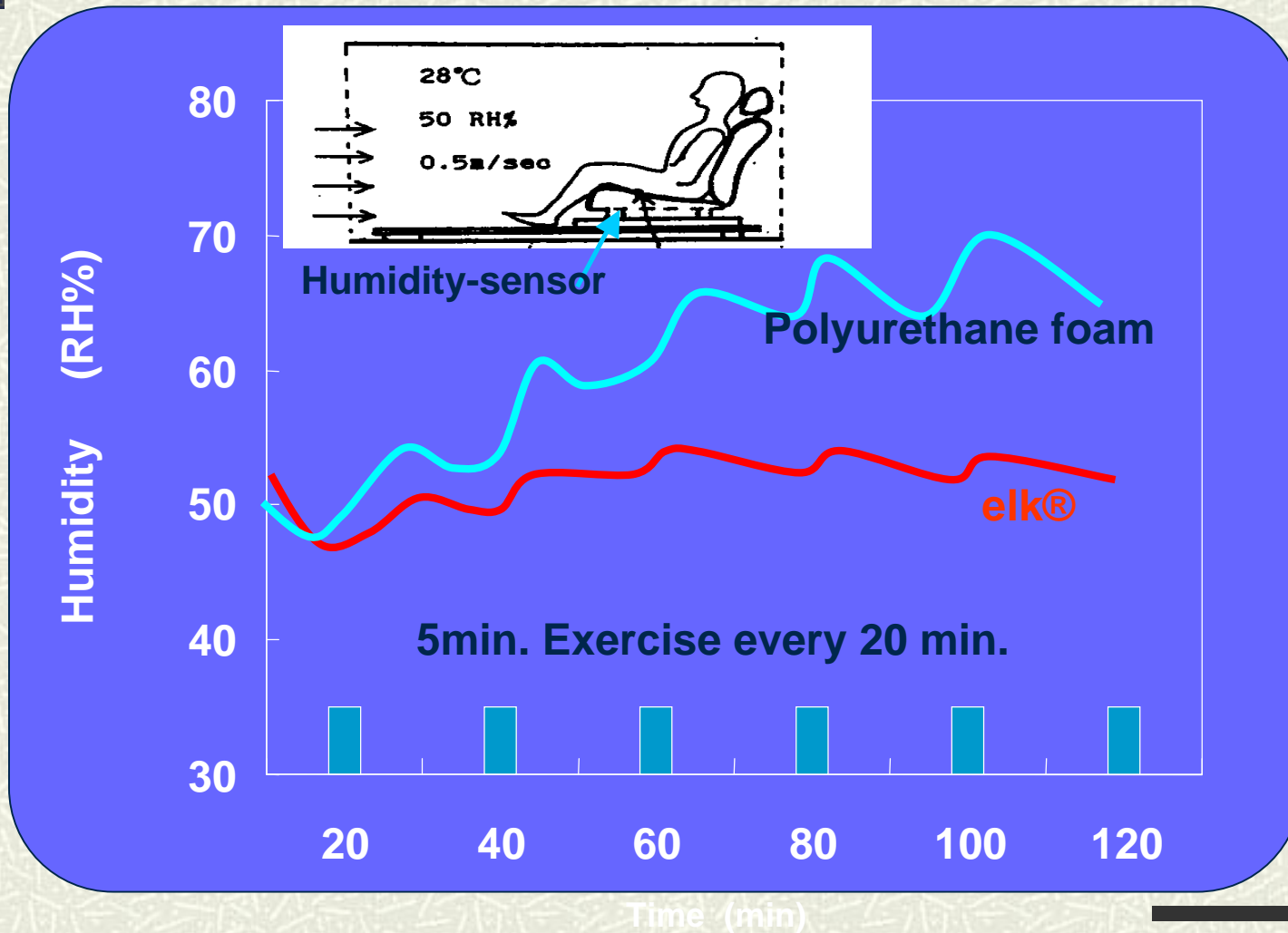


Polyurethane Foam



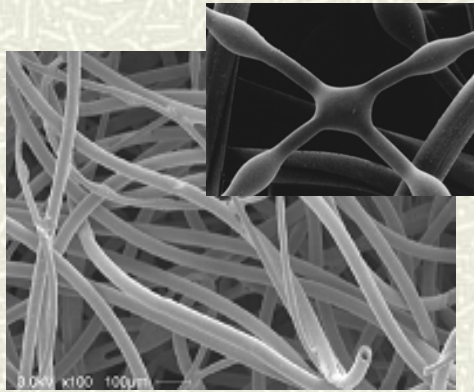
Characteristics of elk®

Comfort: No accumulate sweat vapor

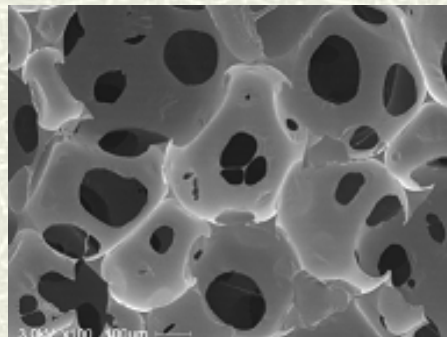


Characteristics of elk®

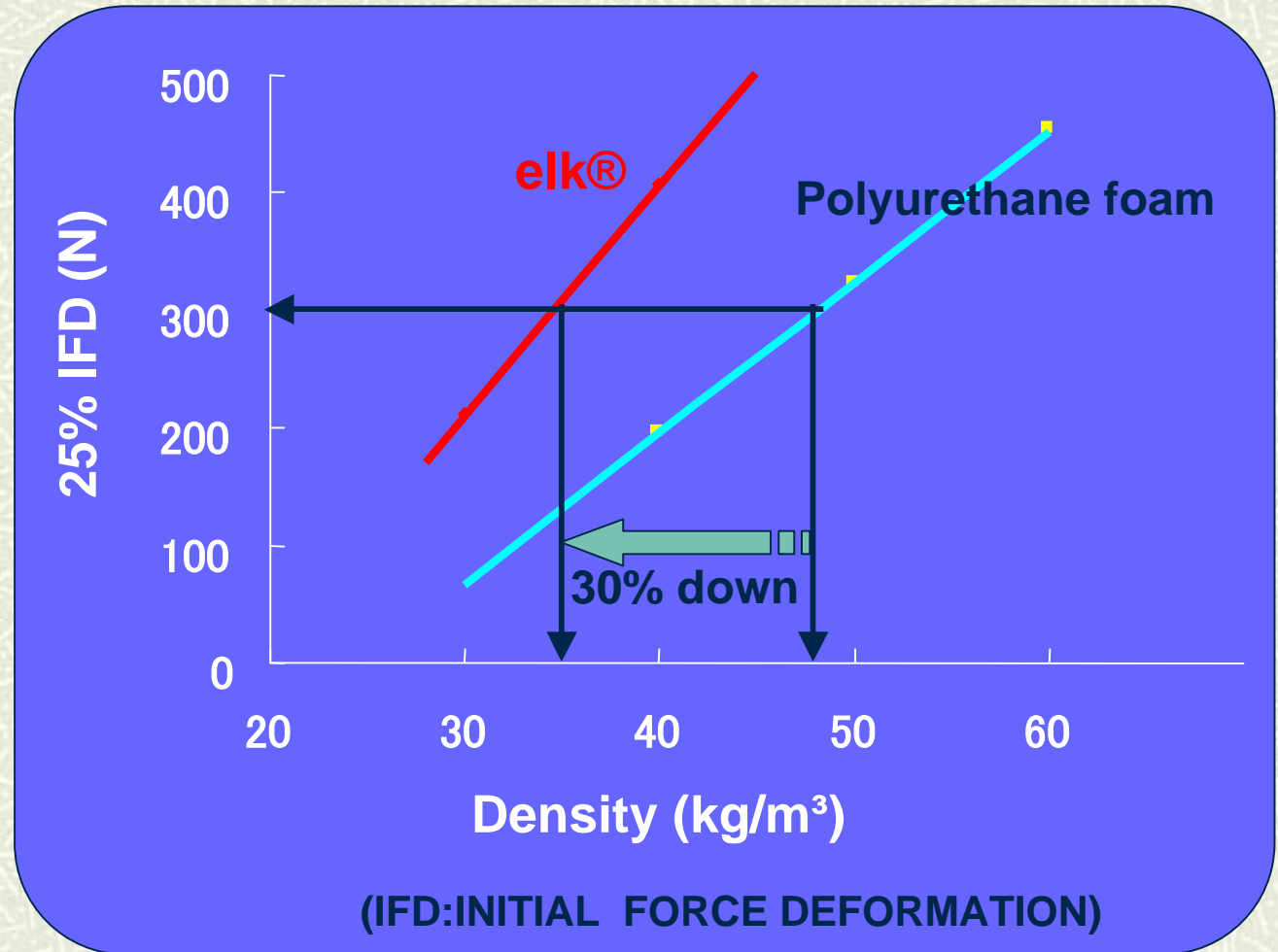
Compressive resilience and Density



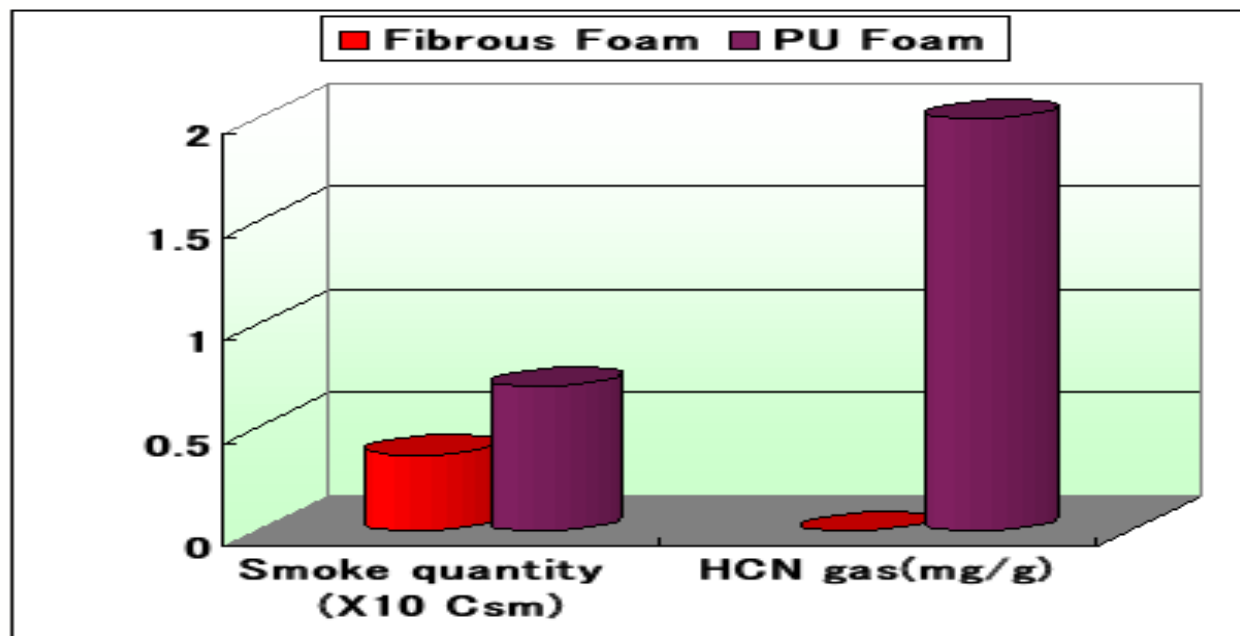
elk®



Polyurethane Foam



Characteristics of **elk®** Smoke & Combustion gas



JIS K-2541	HCN	CO	CO ₂
elk®	Non-detection	34	243
PU Foam	7.2	60	250
Limit of detection (mg/g)	0.005	-	-

Characteristics of **elk®**

Flame retardancy

In the Japanese test

Applications	Test method	Result
Bedding	45°Methenamine	Passed
Automotive	FMVSS 302	Self-extinguishing
Japanese Railway	A-A(Alcohol)	Passed
Others	UL94 HBF	Passed
	UL94 HF-1	Passed

Characteristics of elk®

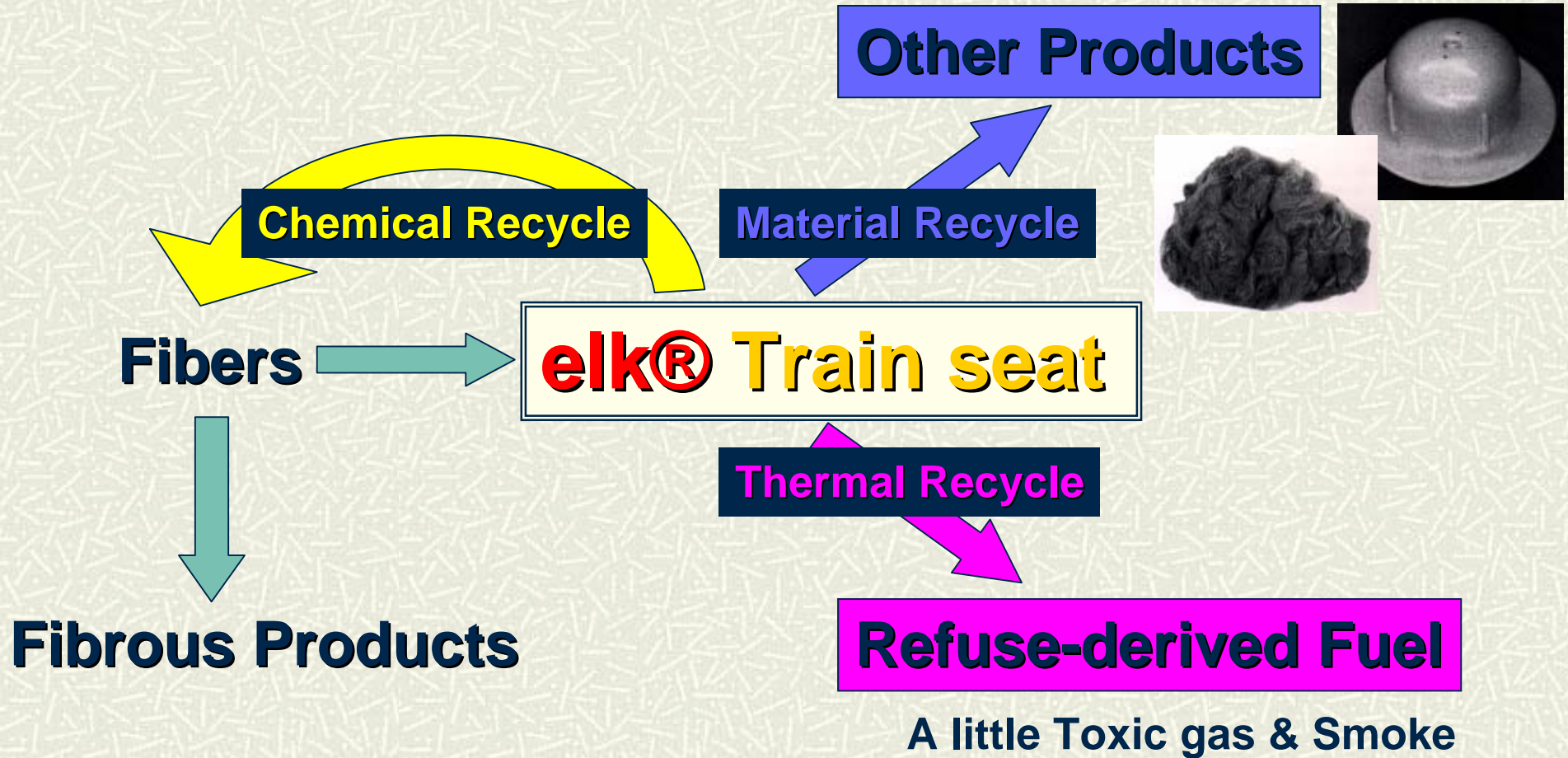
Flame retardancy

In the BS6853 test

	Test method	Result	Remark
Back	BS 476: Part 6	Rejection	There is possibility of the pass by a combination with FRL
	BS 476: Part 7	Invalid Result	melting
	Annex B Toxicity test	Pass	
Base	BS 476: Part 7	Invalid Result	melting
	Annex B Toxicity test	Pass	
Assembly	Annex D Toxicity test	Pass	

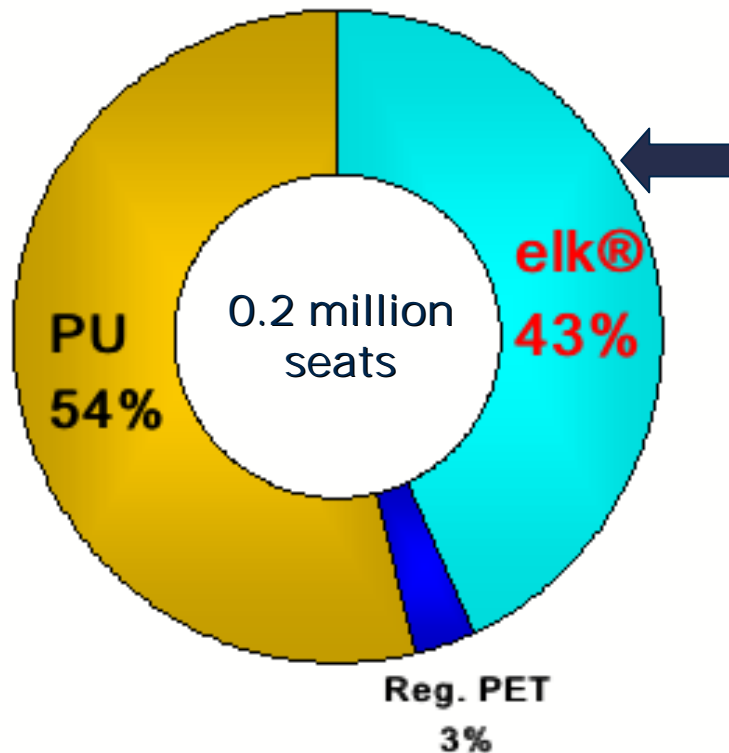
Characteristics of **elk®**

Recyclability: Recycling in Japan



Train Seat Market and share of elk® in Japan

Quantity of seat production by Japanese railway companies (2009)



elk® has already won 40~50% share of the market.

- Light weight
- Recyclable
- A little toxic gas & smoke

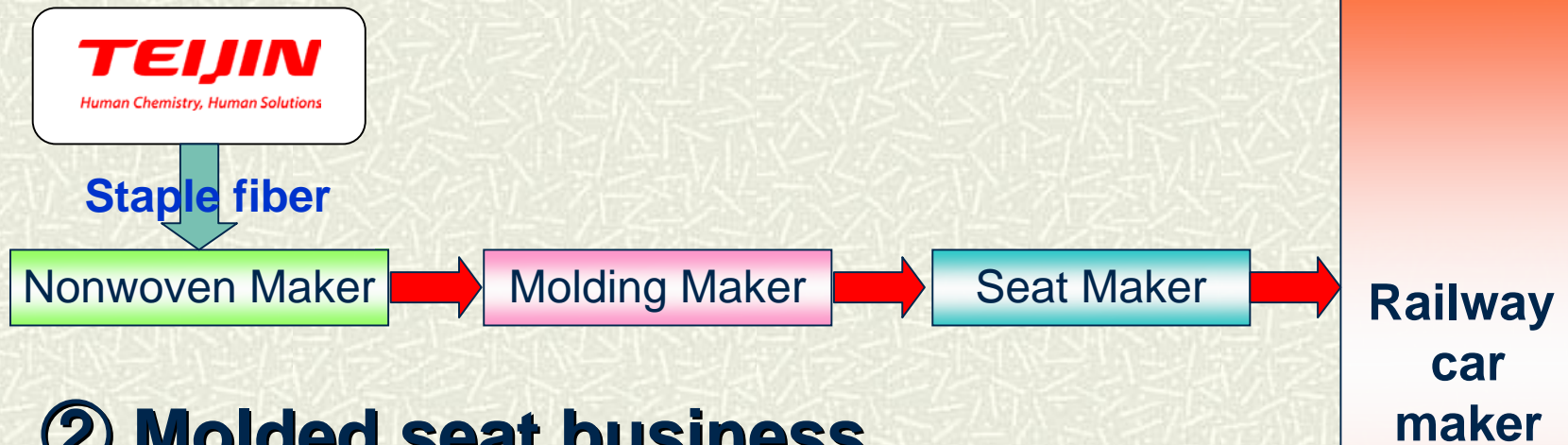
Japanese Railway Companies

- # JR (“Japan Railway”) companies:
East/Central/West/Shikoku/Kyushu/Hokkaido
- # In Tokyo area:
Odakyu / Tobu / Seibu / Keio / Tokyu, etc.
- # In Nagoya area: Meitesu / Kintetsu, etc.
- # In Osaka area: Nankai / Hanshin, etc.
- # Urban metro networks: in Tokyo / Osaka / Nagoya, etc.

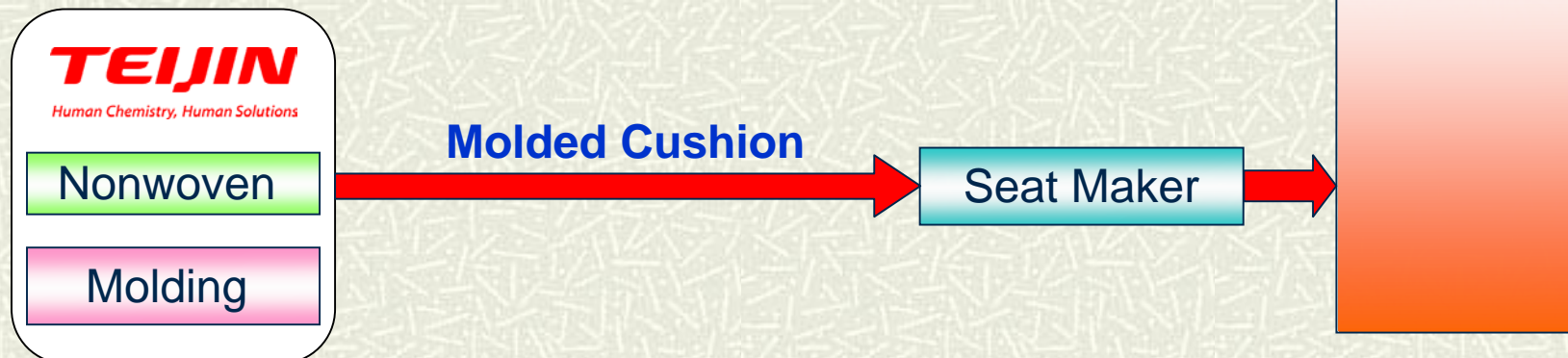


elk® Supply Patterns

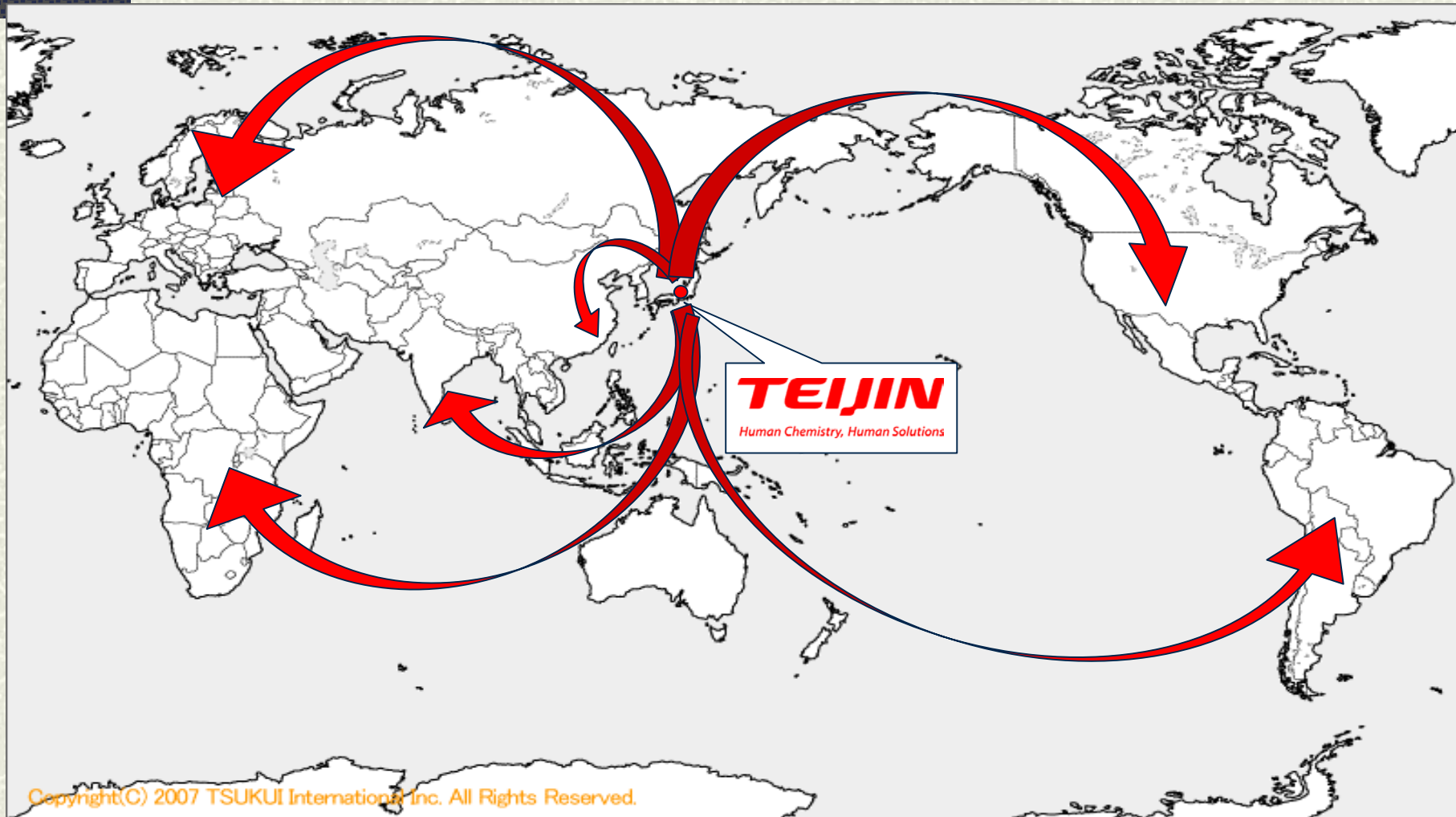
① Fiber business



② Molded seat business



We can supply staple fibers, nonwovens, or molded seats from Japan to all over the world.



Conclusion

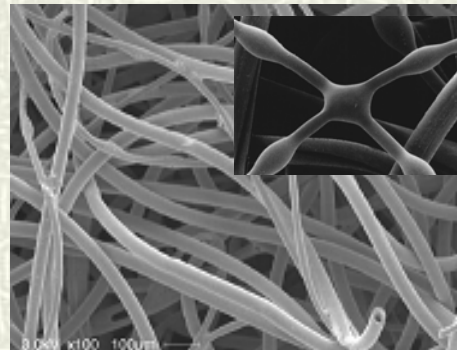
elk® is the material of choice for the train seats.

Breathability, Light weight (less by 20~30%), Environment-friendly (A little toxic gas & smoke, Recyclable)

elk® has won 40~50% share of the market in Japan.



It will propose the train seat market in the world in the future.



Thank you for your kind attention.

TEIJIN

Human Chemistry, Human Solutions