

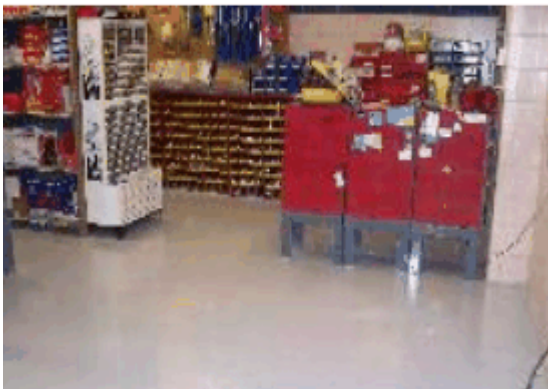


HYBRID NANOSTRUCTURED NONISOCYANATE POLYURETHANE MATERIALS (HNIPU)

Conventional monolithic polyurethanes have good mechanical properties, however they are porous, with poor hydrolytic stability and moderate permeability. In addition, conventional polyurethanes require highly toxic components in their manufacturing, such as isocyanates, rendering production extremely toxic and dangerous. The technical limitations and health hazards of conventional polyurethanes raise the need for modified materials and processes.

HNIPU is a modified polyurethane with lower permeability, increased chemical resistance properties and material synthesis that does not use the toxic isocyanate at any stage of production. Conventional polyurethanes have unstable bonds that are easily hydrolyzed, making the material very vulnerable to environmental degradation. An intermolecular hydrogen bond is formed during HNIPU synthesis that improves hydrolytic stability well above that of conventional polyurethanes. Materials that contain intermolecular hydrogen bonds display chemical resistance 1.5 to 2 times greater than materials of similar structure without such bonds

Synthesis of HNIPU is safe and easy and hardens at ambient temperature without using toxic components in the process. Due to its superior structure and excellent resistance to degradation. HNIPUs are ideal for numerous application including crack-resistant composite materials, chemically resistant coatings, industrial flooring sealants, glues etc. Its outstanding properties are beneficial to many different industries.





HNIPU – The Next Generation of Polyurethane

In comparison to conventional polyurethanes HNIPUs have superior properties, such as:

- Greater hydrolytic stability
- Improved structure
- Reduced permeability
- Superior chemical resistance
- Excellent adhesiveness
- Safer and easier synthesis
- Increased number of applications

Properties of HNIPU Compared to Conventional Polyurethane (PU)

Properties	Conventional PU	Hybrid Nonisocyanate PU
Solid %	76-100	100
POT life	4-6 hours	4-6 hour
Thorough cure time	7 days at 18-22° C	4 days at 18-20° C
Film appearance	clear smooth	clear smooth
Pencil Hardness	H-2H	H-2H
Elasticity	1 mm	1 mm
Impact	40-50 kg/cm	50 kg/cm
Adhesion mark	1-2	1
Coefficient of chemical resistance		
H ₂ SO ₄ 10% at 60°C	0.75-0.80	0.90-0.95
NaOH 10% at 60°C	0.80-0.85	0.95-1.0
H ₂ O	0.85-0.90	0.95-1.0

Adding inorganic powdered substances during the fabrication process can increase the chemical resistance of HNIPUs.



POLYMATE Ltd.

International Nanotechnology
Research Center

Coatings and Paints Selection Criteria Chart

Trade name	Main Properties & Applications		
<i>Floorings</i>			
ECPU 5851W	High chemical, wear and impact resistance including high-humidity media and special sanitary requirements	Indoor application	Curing at RT
ECPU 5851 W-FC			Fast curing at RT
ECPU 5851 LP			Extended pot life
ECPU 3968 K			Curing at low temperature
ECPU 4761 W		Outdoor application,	UV resistant
ECPU 4761 S			Ultra UV resistant
<i>Paints & Varnishes</i>			
ECPU 5851 W-P	High chemical resistance/ high adhesion for substrates metals, concrete, ceramic, plastic & wood	Indoor application	
ECPU 5851 W-CP			Corrosion resistance
ECPU 4761 W-P		Outdoor application UV resistant	
ECPU 4761 S	Varnish Ultra UV resistant		

Hydroxy-Urethane Modified Curing Agent for Epoxy Resin

Uramine 5851	Curing agent for increasing of abrasive, impact and chemical resistance of flooring, paint and other coatings	Indoor application
Uramine 6812		Indoor application Extended pot life
Uramine 4761		Indoor/ outdoor application



Company NanoTech Industries, Inc. (NTI), CA, USA , <http://nanotechindustriesinc.com>. markets HNIPU materials developed by Polymate Ltd.-IYRC under new product names (see Table below and <http://www.hybridcoatingtech.com/company.html>)

HNIPU Materials	Name by NTI	Name by Polymate Ltd.-INRC
<i>Green Polyurethane™ Flooring</i>	FLI4W	ECPU 5851 W
	FLI4 W-FC	ECPU 5851 W-FC
	FLI3	ECPU 3968 K
	FLIO6W	ECPU 4761 W
	FLIO6-S	ECPU 4761 S
<i>Green Polyurethane™ Paints & Varnishes</i>	PI9W	ECPU 5851 W-P
	PI9W –CP	ECPU 5851 W-CP
	PIO15W	ECPU 4761 W-P
	PIO15	ECPU 4761 S