Mitsui Chemicals

Fine Ultra High Molecular Weight Polyethylene Particle

MIPELON™
for Coating Application

Mitsui Chemicals, INC.

- Outline -

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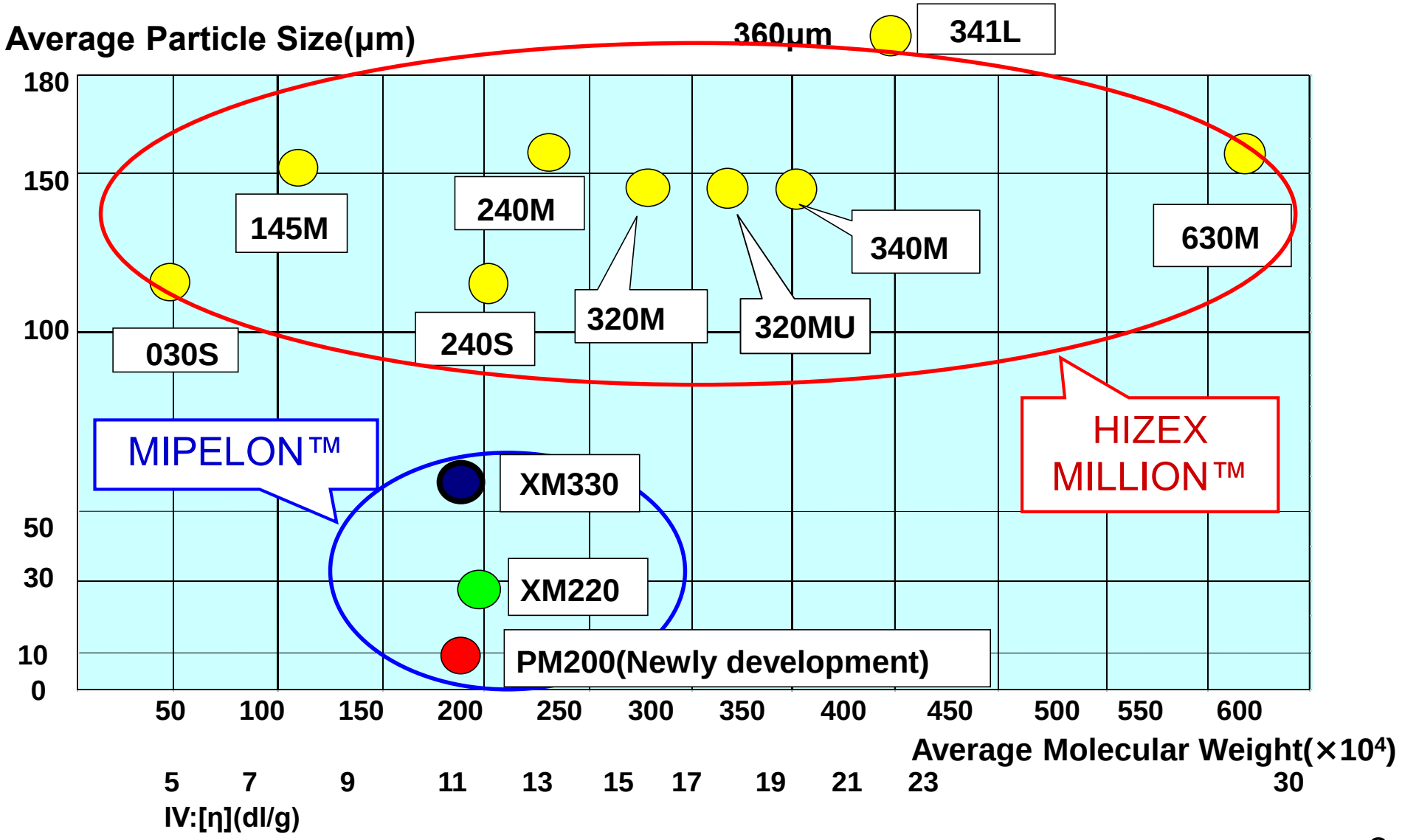
- **What is MIPELON™**
  - MIPELON™ is very fine particle of ultra-high molecular weight polyethylene powder with diameter range of 10mm – 30mm.

- **Characteristics**
  - Geometry Spherical , Narrow Particle Size Distribution
  - Low Friction Coefficient, Low Abrasion Loss
  - Light weight
  - Strong chemical resistance, non-water absorbent
  - Food Safety (eg. FDA CFR 21 SS177.1520(c)(2) Confirmed)

- **Applications**
  - Modifier for Resins, Rubbers, Greases and Paints
  - Sintering Filter

- Grade Lineup -



1. Characteristics of MIPELON™
- Morphology -

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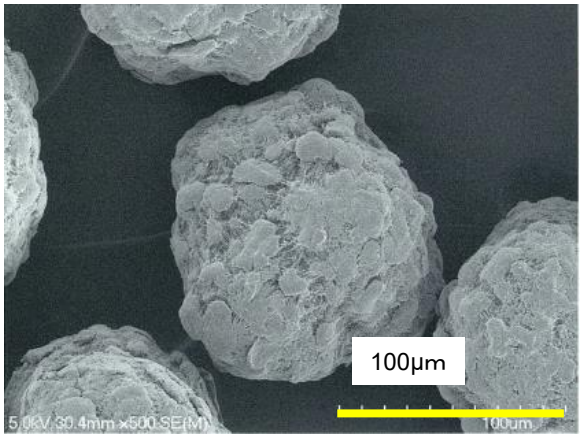
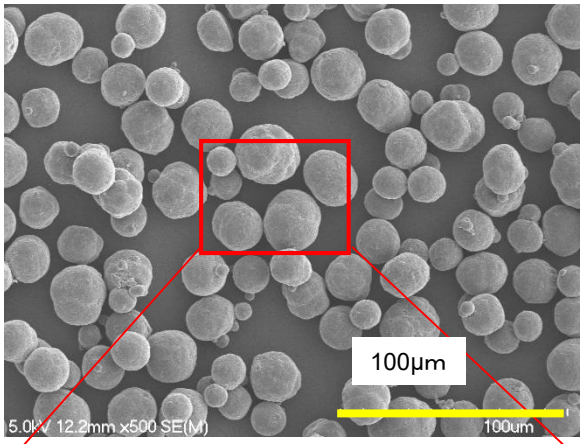
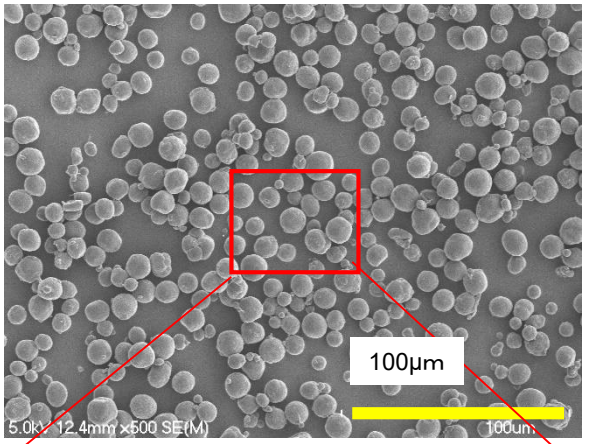
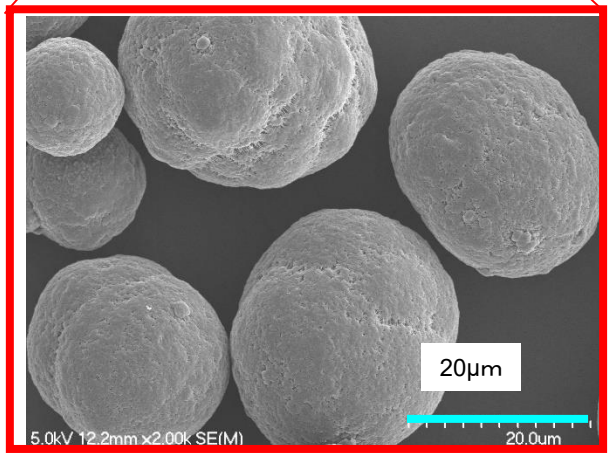
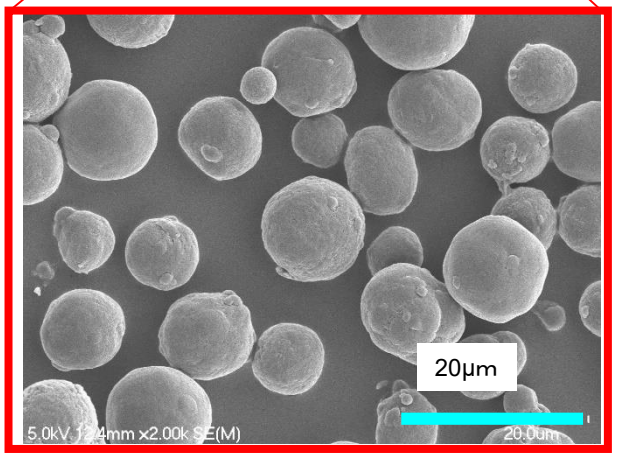
HI-ZEX MILLION™ (120-160μm)	MIPELON™ (XM220 30μm)	MIPELON™ (PM200 10μm)
		
		

- Particle Size Distribution-

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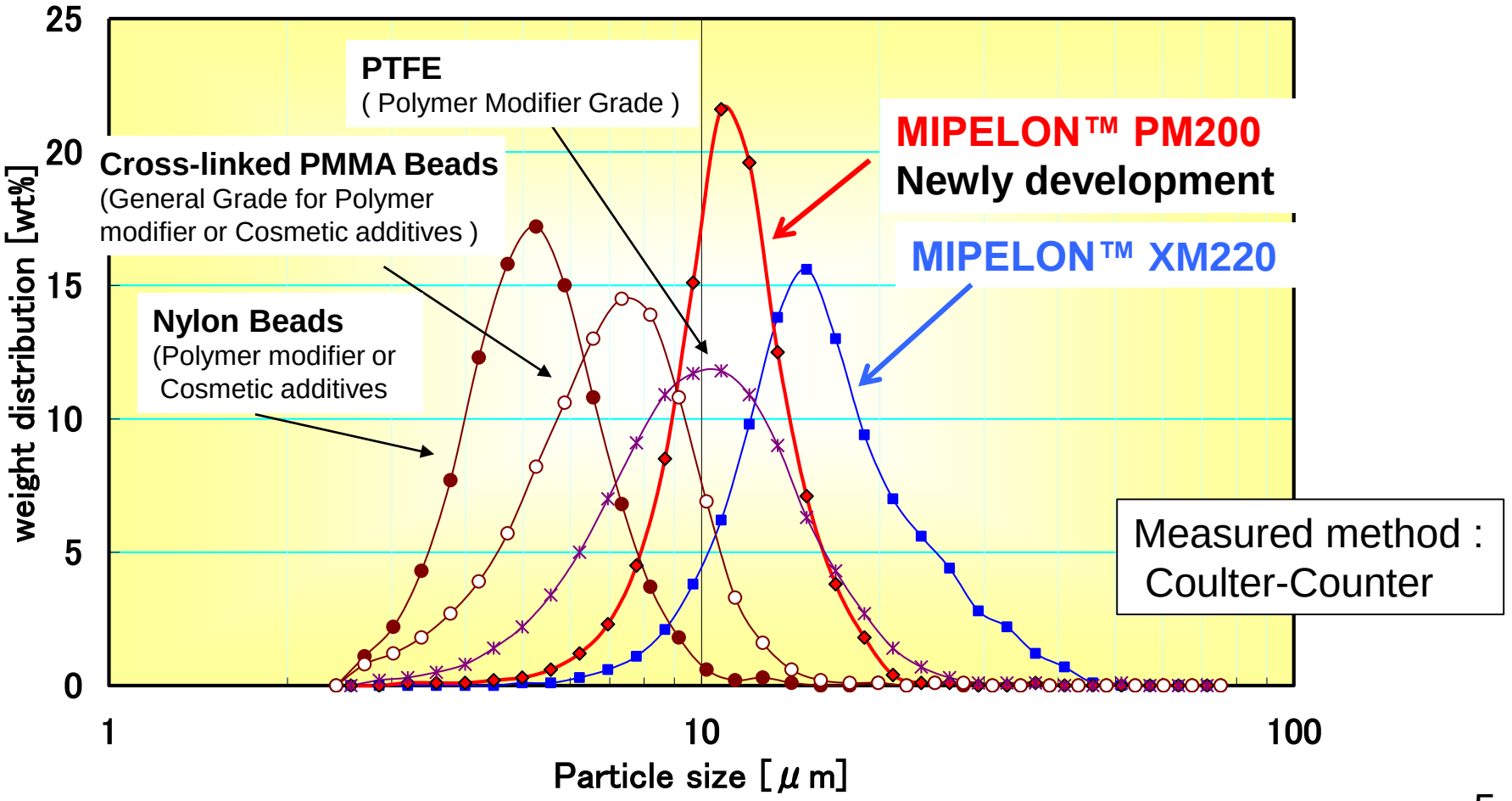
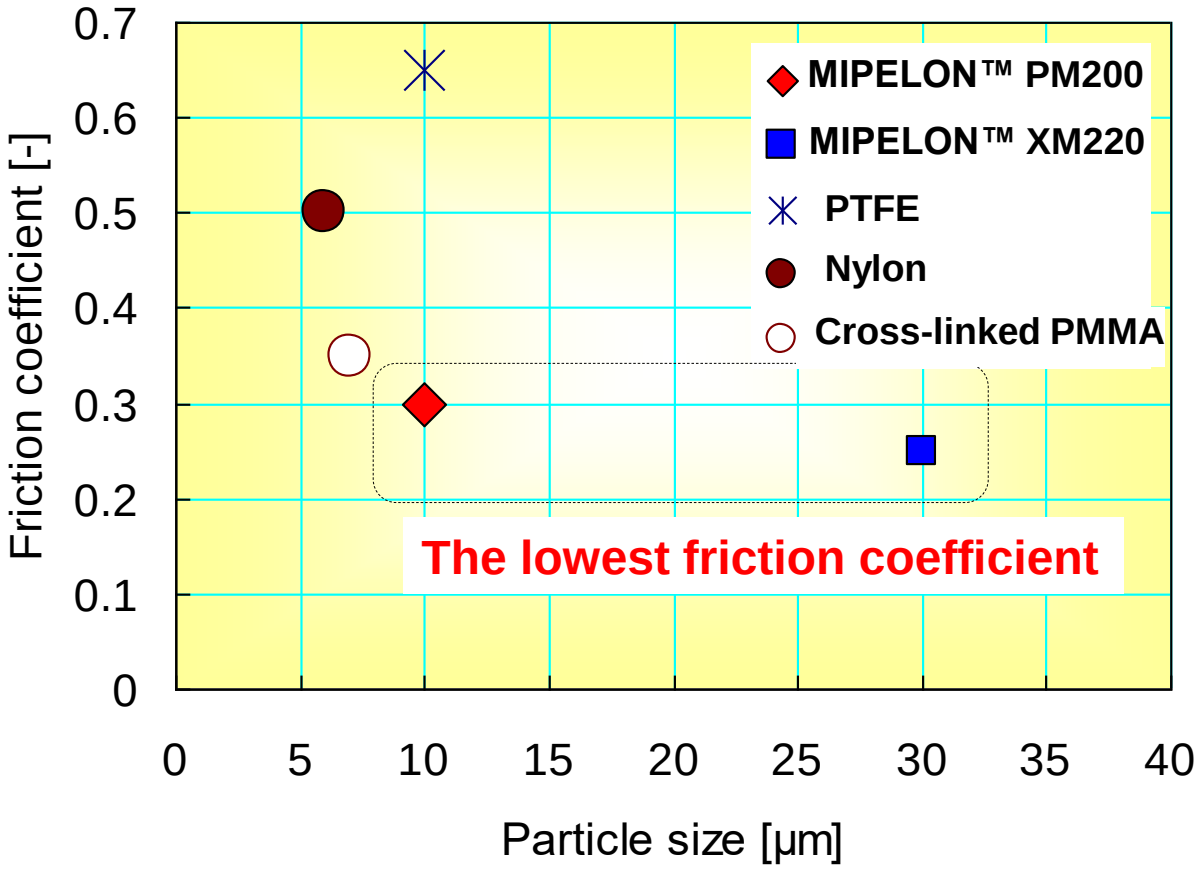
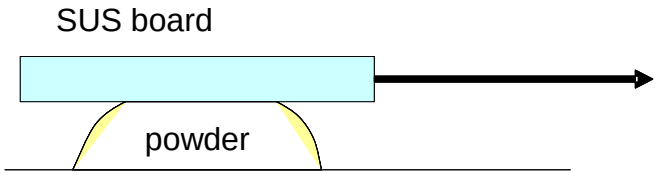
"MIPELON™ PM200" has nearly the same particle size as other organic beads used for polymer modifier, and shows narrower size distribution.



- Friction Coefficient -



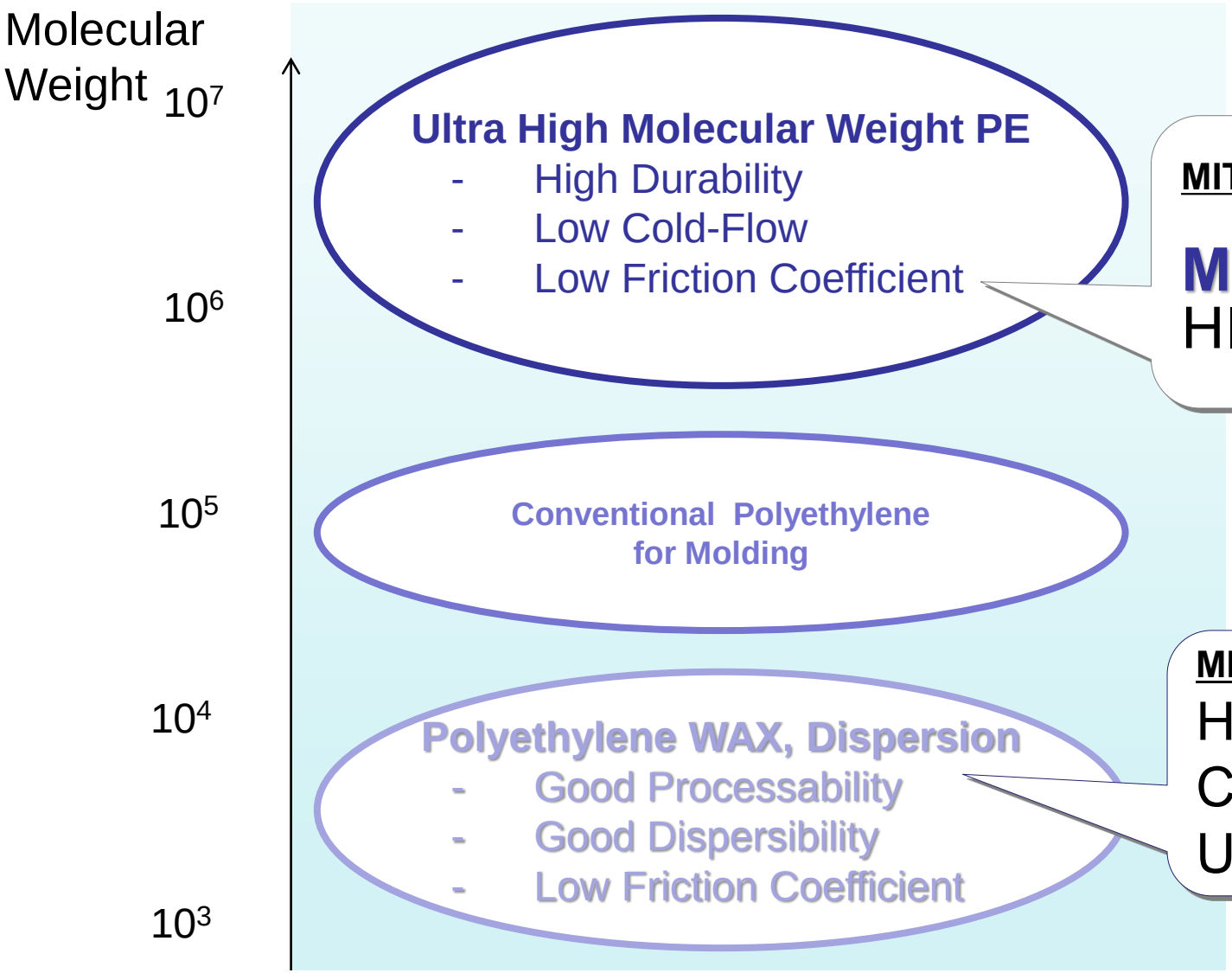
Measurement method of friction coefficient



Friction coefficient is calculated from the load which is generated when SUS board is slid on the sample powder put on the stage.

Spherical shape and smooth surface of MIPELON™ enable to remark the lowest friction coefficient in the compared fine particle.

- Molecular Weight Effect -



MITSUI CHEMICALS' Products

MIPELON™
HI-ZEX MILLION™

MITSUI CHEMICALS' Products

HI-WAX™
CHEMIPEARL™
UNISTOLE™

- Dispersibility in Water based PU Coat -

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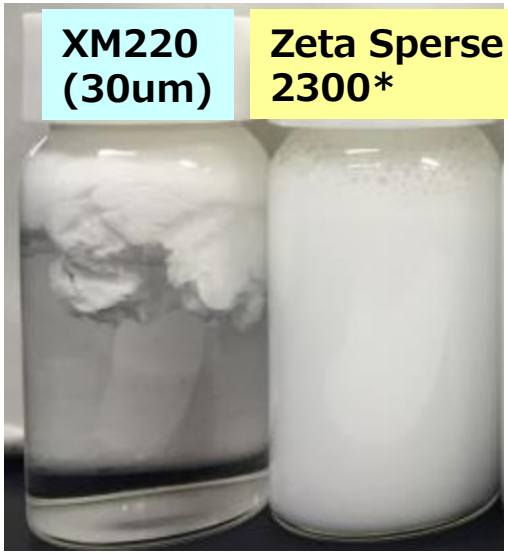
· **The following dispersants can be used in MIPELON™/water.**

XM220/water	PM200/water	PM200/water
		

【Dispersant: Made by Evonik.】
The dispersant is added in an amount of 3 to 4% based on MIPELON.
Dynol 604, Dynol 607, ZetaSperse 2300 are effective.

- Improvements of COF and Abrasion resistance-

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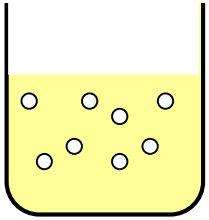
Test of MIPELON™ surface coating on EPDM sheet.

Existing primer

EPDM sheet → Primer coating
Thickness : ~3um → r.t., 10min,→70℃,30min
Drying

Paint with
MIPELON™ and Dispersant



Existing water based PU coating → Main coating
Thickness : 40~50um → r.t., 10min,→70℃,30min
Drying

– Improvements of COF and Abrasion resistance–

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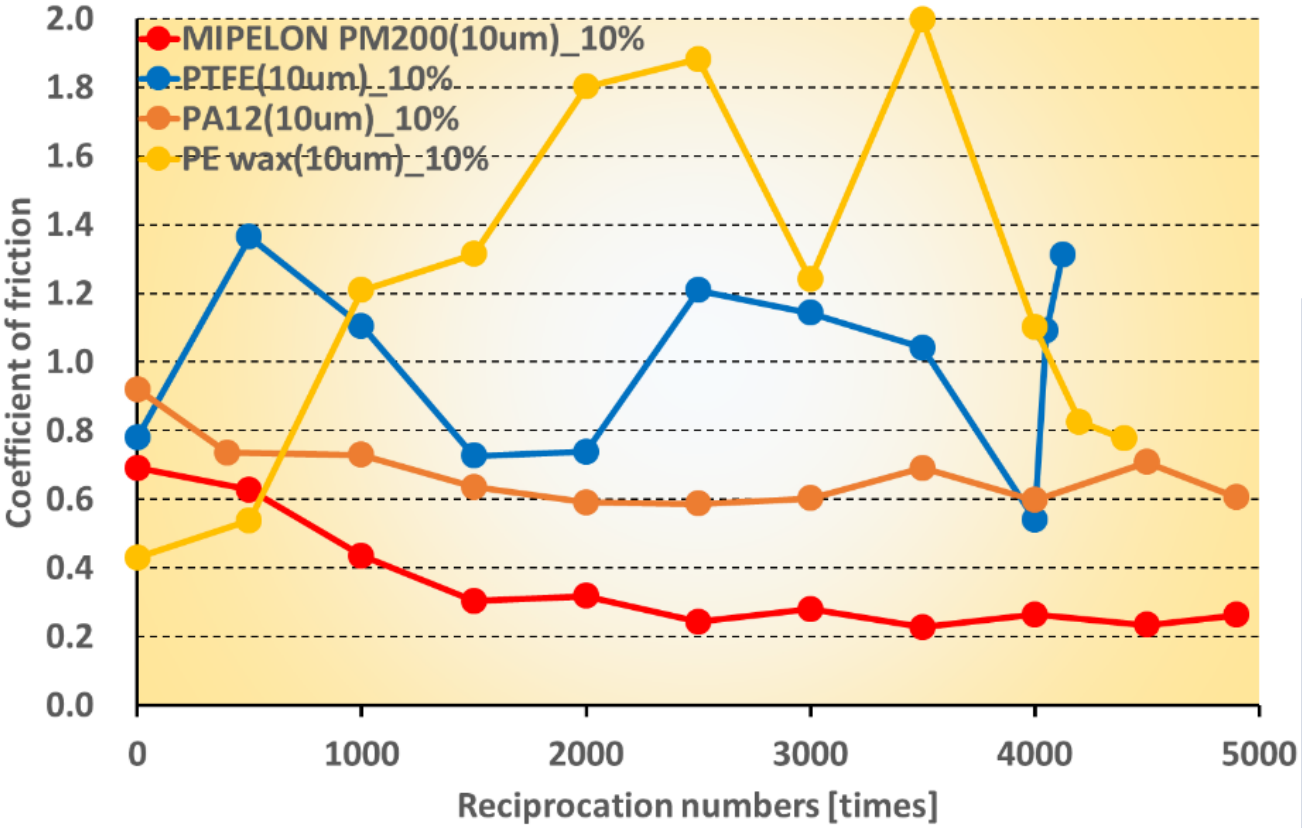
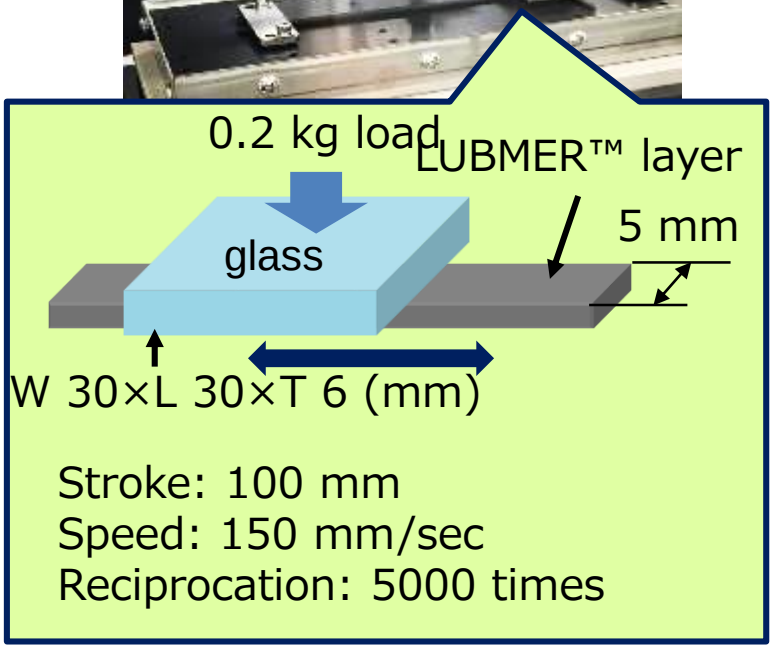
Measurement result of friction coefficient with glass.



Figures are just representative values, but not specification values.



MIPELON™ improves slipperiness than PTFE, PA and PE wax.

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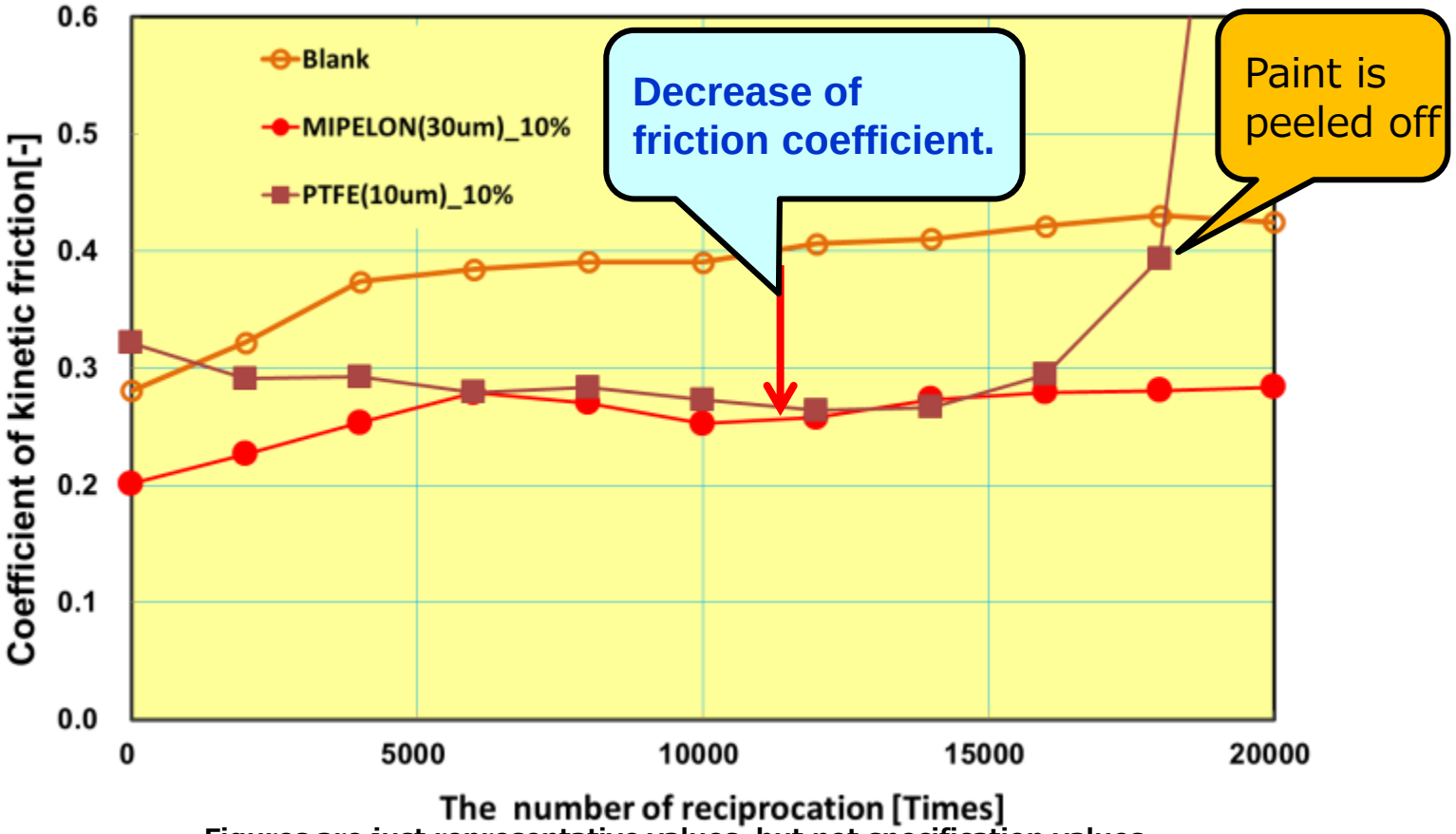
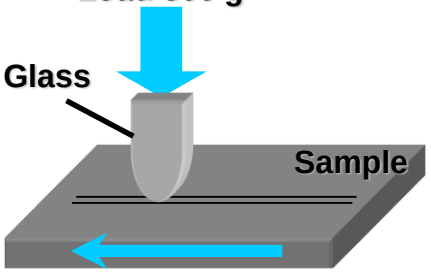
Measurement result of Durability with glass.



Test condition:23℃,
Contact material: Glass,
Load: 500 g, 48 times/min



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MIPELON™ coating has low friction coefficient and good durability compared with PTFE.

3. Effect of addition of MIPELON™
– Consideration on improvement of COF and abrasion resistance –

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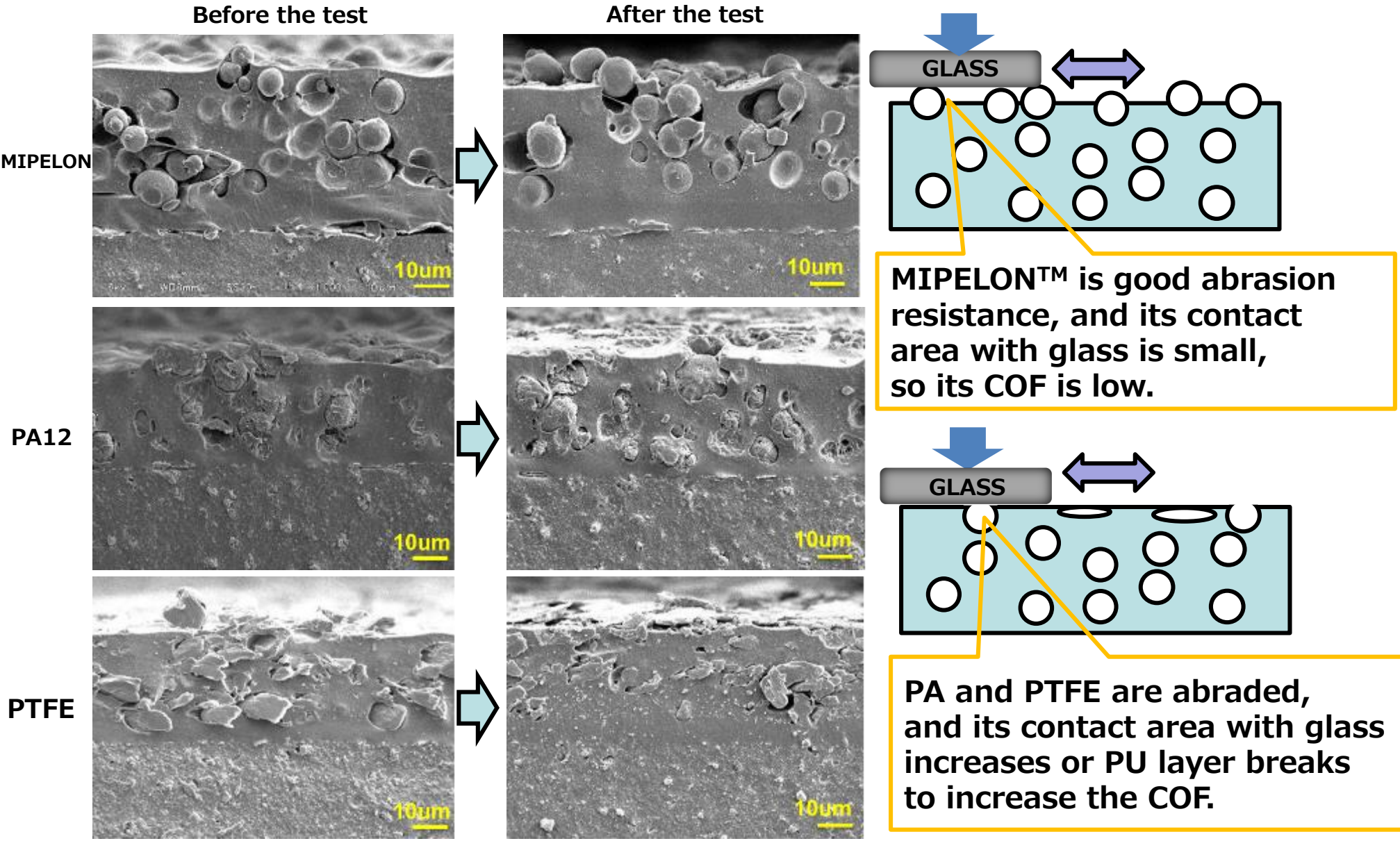

4. Effect of addition of MIPELON™

- Dispersibility in Solvent based PU Coat -

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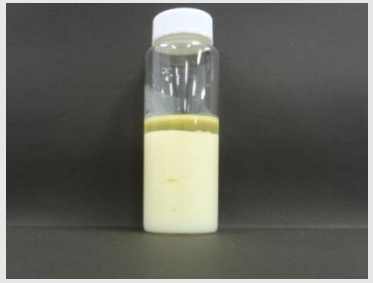
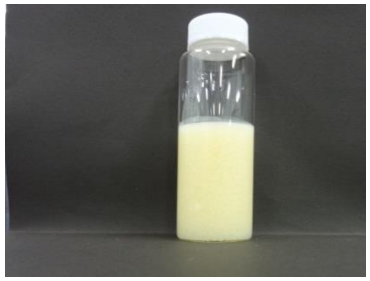
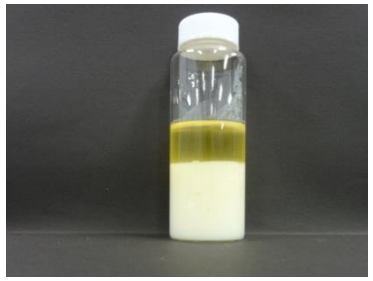
	PM-200	XM-220	PTFE
24 hrs			
72 hrs			

Testing Method: observed the static standing test tube after blending various resins and polyurethane paint.

PTFE is commonly used to reduce friction coefficient of paints, but one of the problems to use PTFE is poor dispersibility. In our lab test, PTFE powder settled out due to the specific gravity difference, on the other hand, MIPELON kept the initial state in Urethane paint.

Application: Matte agent, Slipper agent with durability

4. Effect of addition of MIPELON™
– low friction coefficient in PU Coating–

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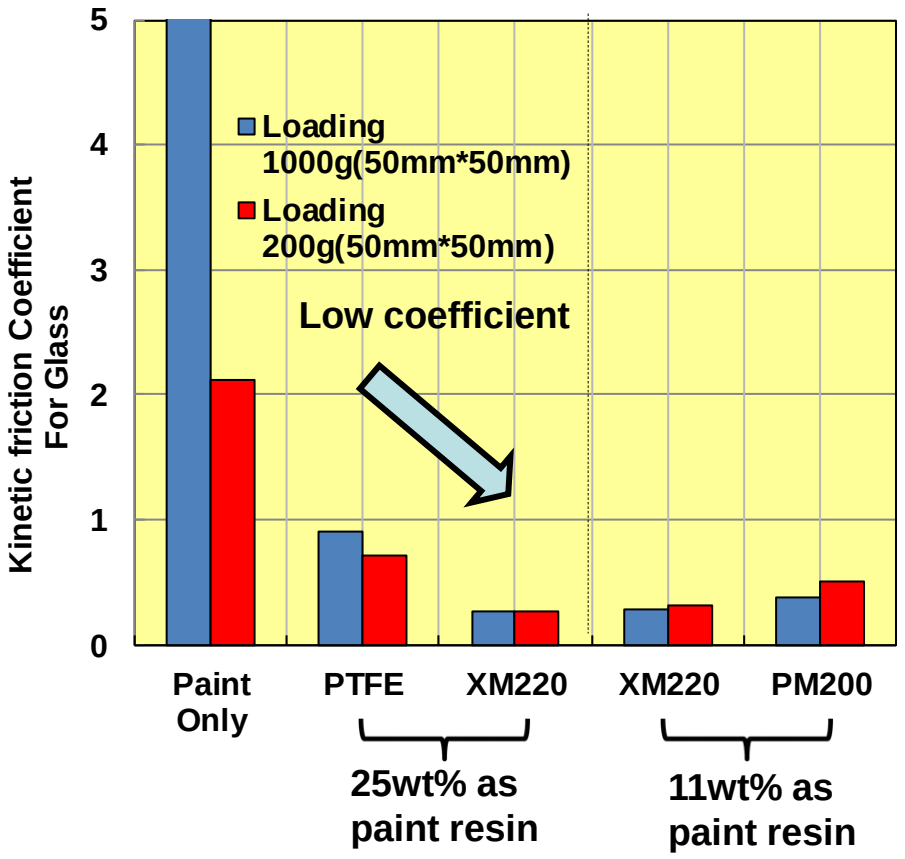

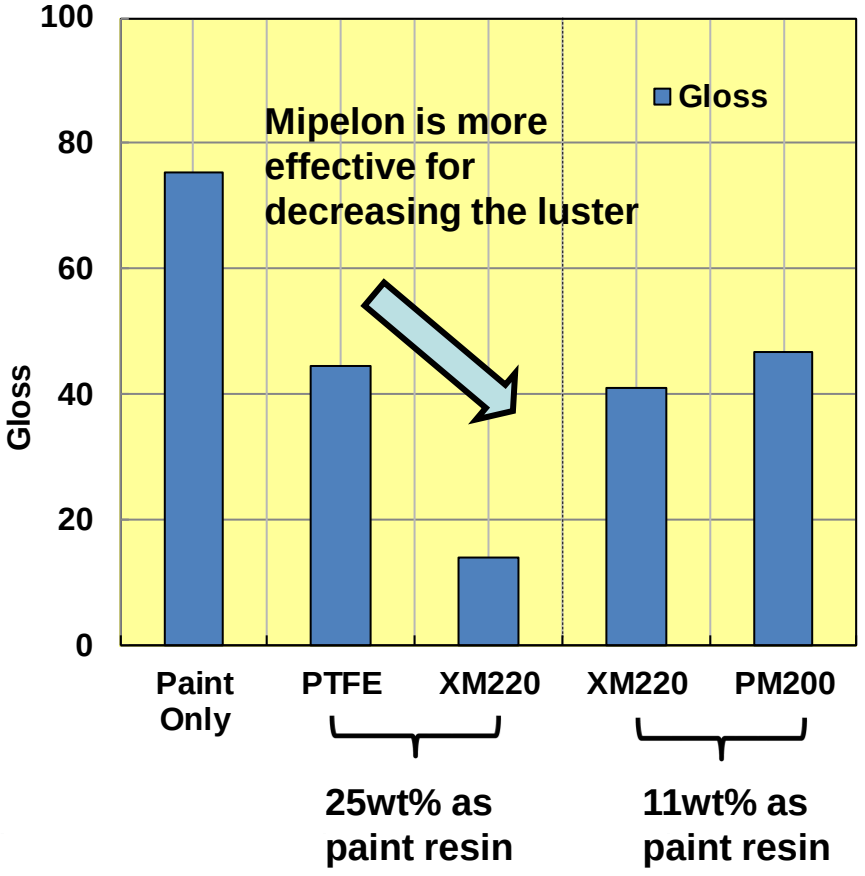

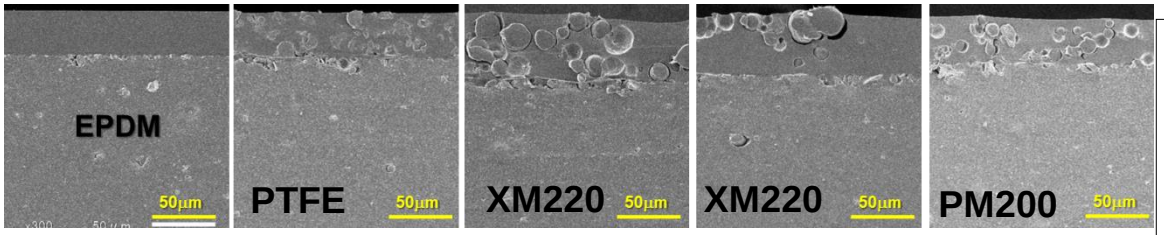

MIPELON™ has better slipperiness than PTFE even with small addition amount. Moreover, it has the effect of the matting effect.

4. Effect of addition of MIPELON™
– Durability –

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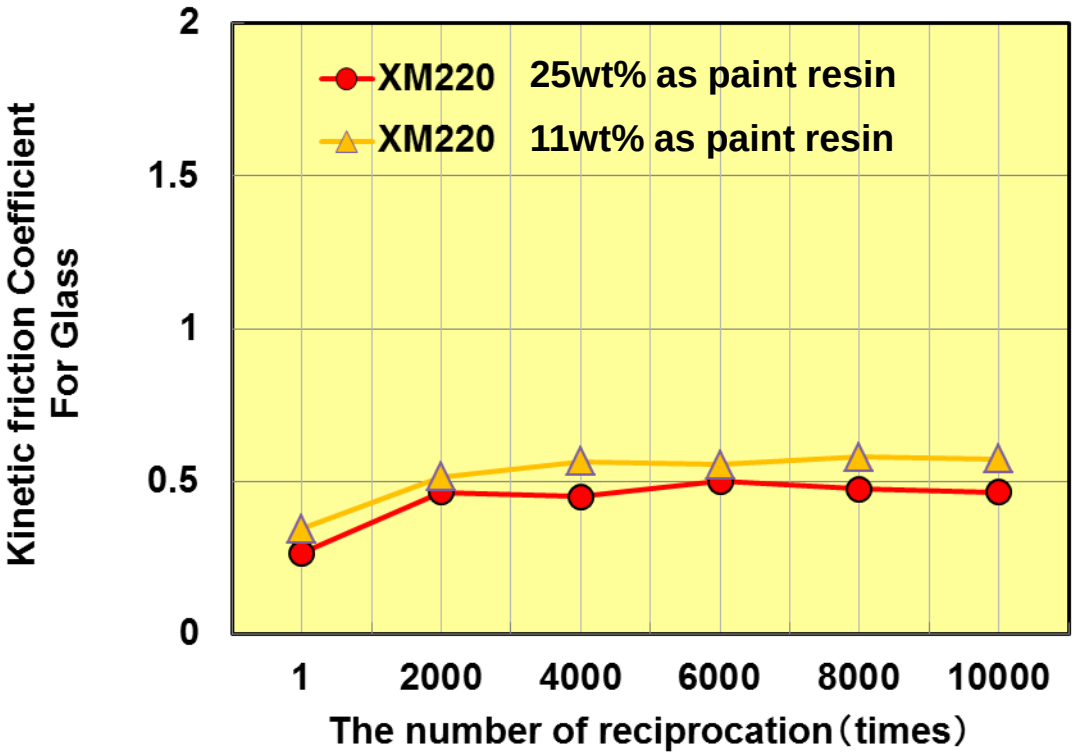
◆The coating of MIPELON™ shows high durability property.



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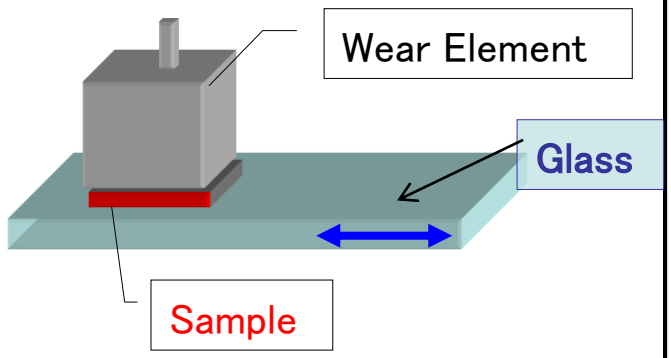
Measurement Condition



<Abrasion Measurement>
Load 200g
Wear Element SUS
Sample 20x20mm,
Speed 60 times/min

5. Data of MPELON™

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Item	Unit	Testing method	MIPELON™ XM-330	MIPELON™ XM-220	MIPELON™ PM-200
Mw	$\times 10^4$	MCI method	180	200	180
Density	Kg/m^3	MCI method	940	940	940
Bulk Density	Kg/m^3	ASTMD1895	500	400	320
Melting Temperature	^oC	ASTMD2117	136	136	136
Average Particle Size	μm	Coulter-Counter method	60	30	10

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Newly development

6. Summary

- MIPELON™ is one of the best solution as an additive to improve the abrasion resistance, friction properties and matiness of other resins, rubbers, greases and paints.
- MIPELON™ remarks high durability as an additive due to its ultra high molecular weight.
- MIPELON™ enables to reduce COF with the smaller amount of addition, compared to PTFE
- MIPELON™ can easily disperse in water and solvent based polyurethane paints which are commonly used to improve the abrasion resistance of EPDM with dispersant.