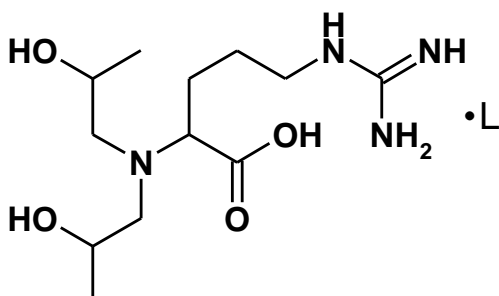


1 What is WILBRIDE® R-PL ?**Chemical structure**

R: Arginine
 P: Propylene oxide
 L: Lactic acid

Appearance: Pale yellow liquid
 Concentration: 50wt%aq.
 pH: ca. 7.0

Concept*Glossy Amino Moisture***INCI****PPG-2 arginine, lactic acid, water****2 Features**

- ① Acting on the interior of a hair, and providing a damaged hair with natural gloss.
- ② Improving the hair strength by repairing damaged pores.
- ③ Improving the cohesion of the damaged hair.
- ④ Providing the surface of a hair with smooth feeling.

3 Glossy enhancing effect

<Equipment> SAMBA hair system by bossa nova technologies.

<Evaluation> Calculating “luster value” by the following Reich-Robbins equation.

$$L_{\text{Reich-Robbins}} = \frac{S}{D * \theta_{1/2}}$$

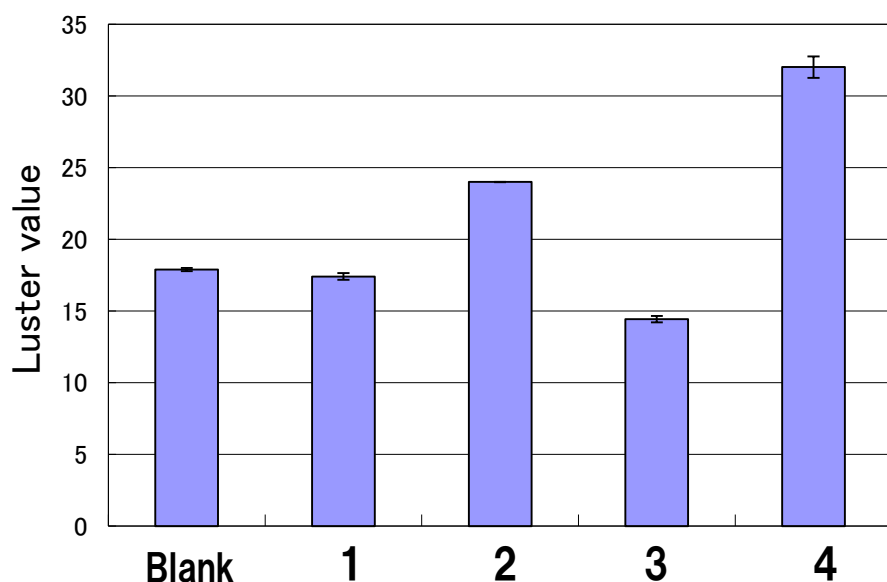
S : Total reflection

D : Total amount of diffused light

$\theta_{1/2}$: The half breadth of the distribution of diffused light

<Experiment> Soaked damage hair into each test solution for 1 hour at 25°C, and dried the hair.

<Result 1: Measurements of luster value>



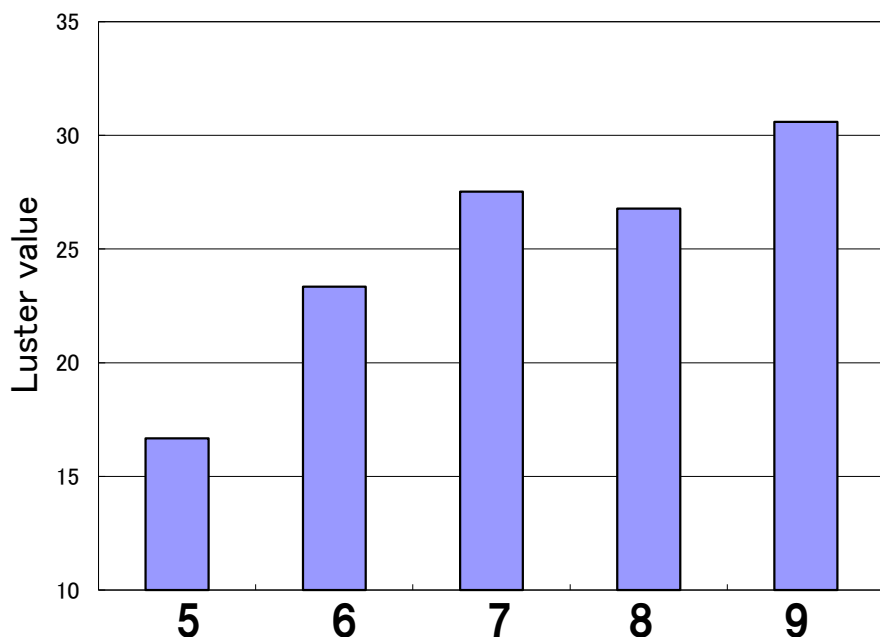
<Samples>

1. Malic acid (MA)
2. Arginine•MA
3. Dihydroxy-propyl arginine•HCl
4. PPG-2 arginine•MA

<Conditions>

Dosage: 4wt% a.i.

<Result 2: Effect of counter ion>



<Samples>

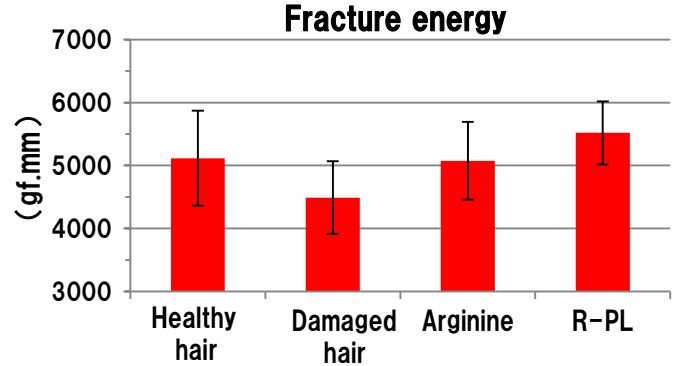
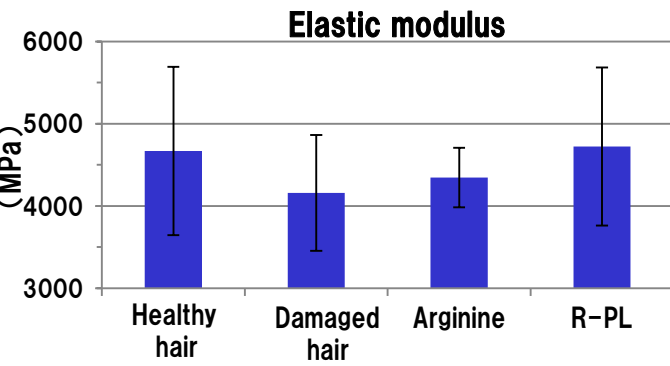
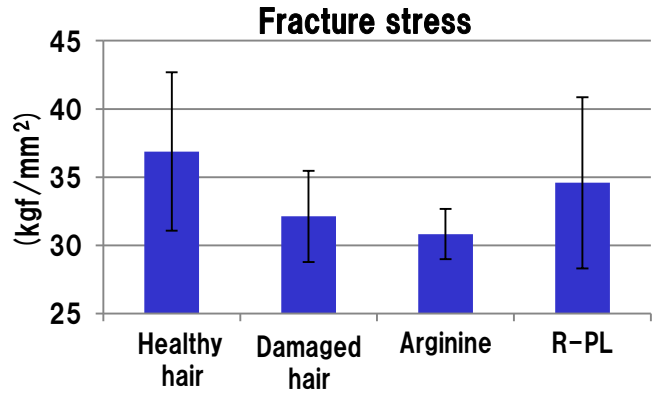
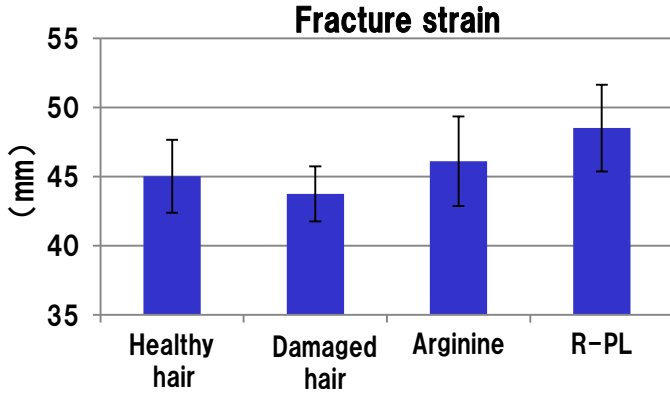
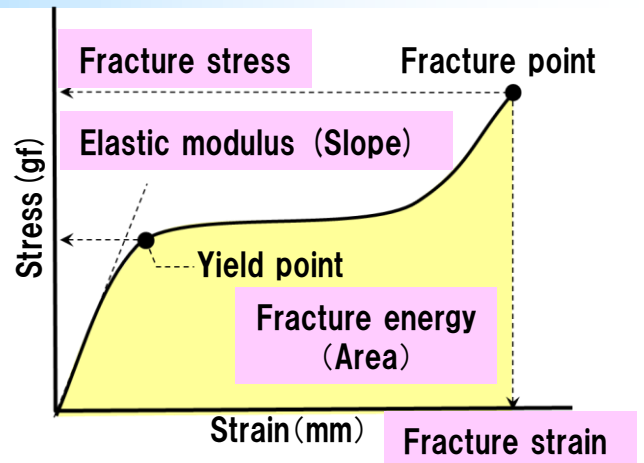
- PPG-2 arginine neutralized by
5. Hydrochloric acid
 6. Malic acid
 7. Citric acid
 8. Glutamic acid
 9. Lactic acid

<Conditions>

Dosage: 2wt% a.i.
pH: 6.0±0.3

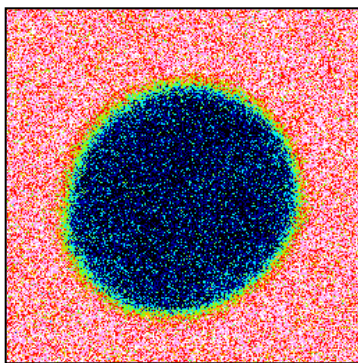
4 Hair strength: Tensile test

Sample :R-PL, L-arginine
 (1wt%active, pH6.0)
 Hair :Human hair BS-PG (BYAULAX)
 Equipment :Autograph AGS-J (SHIMAZU)
 Condition :Speed: 60mm/min, 25°C, N=10

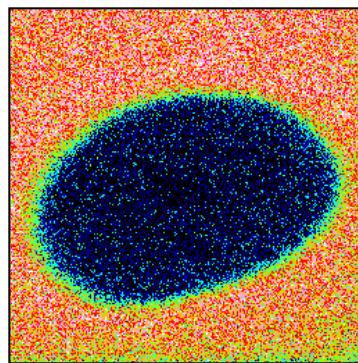


5 Permeability: TOF-SIMS positive ion image

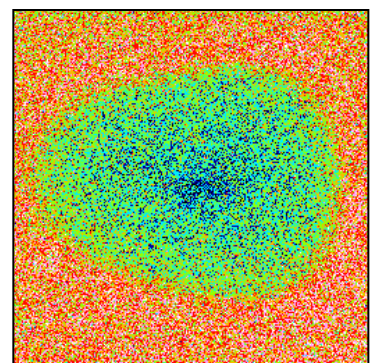
Distribution of fragments derived from arginine ($m/z=58.1:C_3H_8N$)



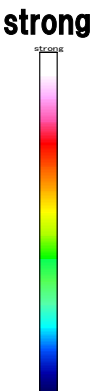
Blank
(Damaged hair)



Treated with arginine
(1wt%active, pH6.0)



Treated with R-PL
(1wt%active, pH6.0)



weak
Peak
intensity

Equipment: TOF.SIMS5 by ION-TOF, Primary ion source:Bi

6 Application

Hair mist

INCI	NOF products	wt%
PPG-2arginine Lactic acid Water	WILBRIDE® R-PL	1.0
PPG-9 diglyceryl ether	UNILUBE® DGP-700	4.0
Alcohol	—	5.0
Disodium EDTA	—	0.1
Preservative	—	q.s.
Water	—	Balance

<Procedure>

All ingredients mix and dissolve at room temperature.

※The safety and intellectual property right are not guaranteed.

7 Safety data

Mutagenicity (Ames test)	Negative
Human patch testing (34 adults, occlusive patch 24hours)	Negative
Cell toxicity testing (SIRC)	LD ₅₀ > 10,000 ppm
Primary irritation testing (OECD test guideline No.439)	Non irritation
Local lymph node assay (OECD test guideline No.429)	Negative

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