



ECOORI

SUSTAINABLE. INNOVATIVE. NATURAL

A low-angle, teal-tinted photograph of an industrial facility. The scene is dominated by large, cylindrical storage tanks and a complex network of pipes and walkways. The sky is a clear, light blue. The overall aesthetic is clean and modern, suggesting a focus on technology and innovation in industry.

**To be the innovator
of the world's best
green chemistry**

ABOUT US

With Ecoori, we aim to revamp the chemical industry by formulating safe and sustainable solutions that drive innovation for your businesses. We promise only the best quality chemicals – for your businesses and for our planet.



SUSTAINABLE



INNOVATIVE



NATURAL

OUR MISSION

To drive the chemical industry towards **SUSTAINABILITY**

For years, we have held on to the belief that environmental sustainability and the development of the chemical industry should go hand in hand. With that, we created our very own green chemistry concept – Ecoori.



OUR BRAND STORY

Making chemicals green

The chemical industry is undoubtedly a controversial one. One on hand, chemicals have long been seen an environmental threat. Yet on the other, chemicals are an essential component so widely present in our daily lives.



NATORI PGA 92

γ -POLYGLUTAMIC ACID



γ -Polyglutamic Acid

NATORI PGA 92

First recognised in Japanese food “Natto”, It is a natural multifunctional biopolymer produced with *Bacillus Subtilis* by fermentation. Large number of carboxyl groups along the molecule chain can form hydrogen bonding in a molecule or between different molecules. Thus it has high water absorbability and moisture-retaining capability.

- 🌿 Synergistic effect
- 🌿 Whitening
- 🌿 Long-lasting moisturisation

Efficacy – Long Lasting Moisturisation

Long-lasting Moisturization

- Possessing high moisturizing capability, much better than Hyaluronic acid and Collagen
- Keeping moisture of skin for longer time
- Restoring skin elasticity and smoothing wrinkles

Synergy

- Stabilizing and increasing HA of skin
- Stabilizing NMF of skin
- Increasing nutrients absorption

Healthy Whitening

- Controls melanin synthesis to prevent and reduce freckles.
- Inhibits tyrosinase, which in turn induces the formation of Melanin.
- Forms a film upon surface of skin which fences out ultraviolet.

Application

Gamma PGA has **excellent compatibility** in non-ionic, anionic and amphoteric surfactants. It is applied to cream, essence, astringent, face mask, eye gel, sun cream, shampoo, body wash, lotion, hairstyle formula etc.

Dosage of the material depends on the function of the skin-care products.

Recommended Dosage

General – γ -PGA is 5%.

γ -PGA (HM): 1%

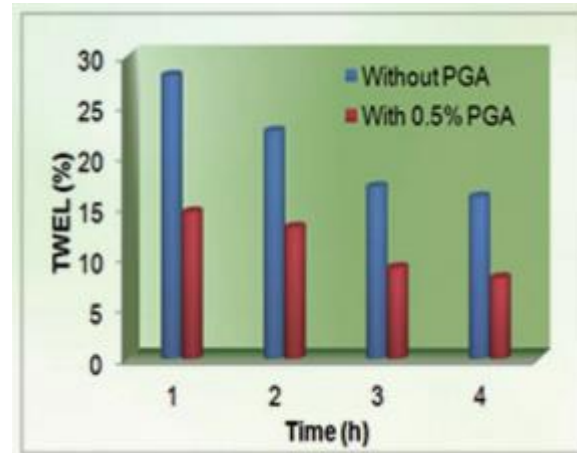
- More suitable for anti-wrinkle, UV preventing and moisturizing and strengthening products.

γ -PGA (LM): 3%

- Better for facial masks and whitening products due to its nutrition transdermal absorption and melanin inhibition effect.

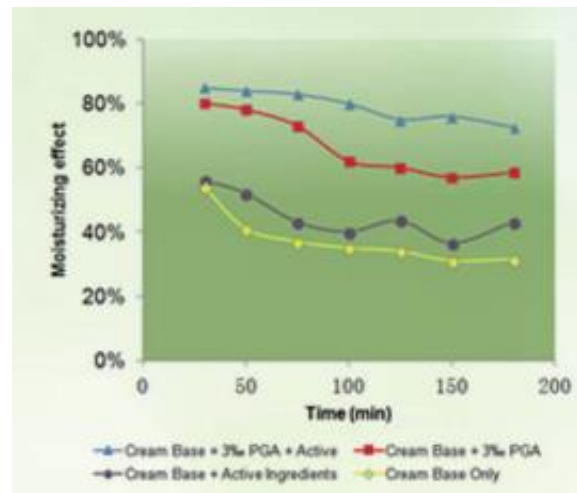
Efficacy – Long Lasting Moisturisation

Effect of γ -PGA on Trans-Epidermal Water Loss (TEWL)



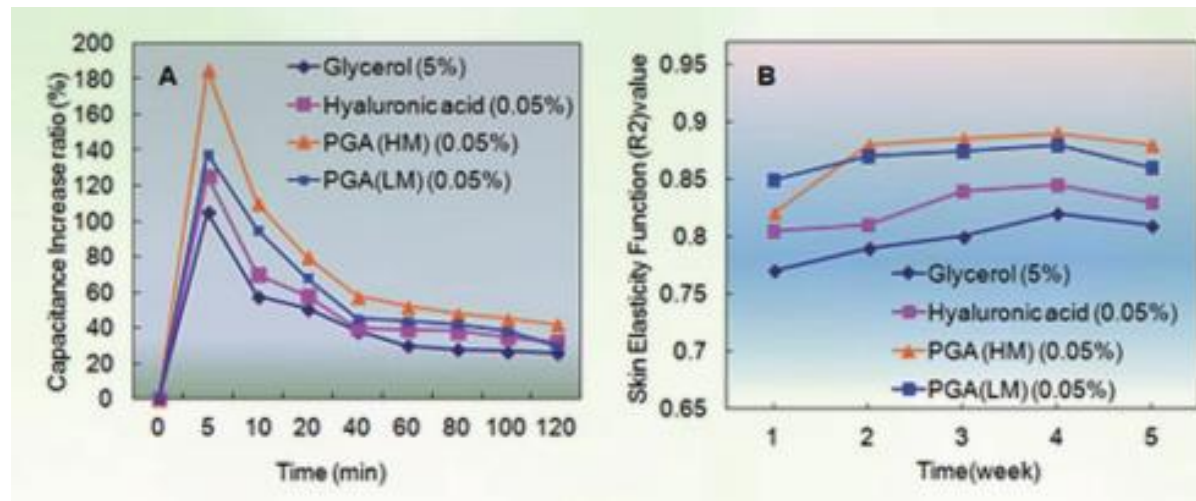
γ -PGA can enhance the moisturizing capability of skin without breaking its moisture balance.

Synergistic effect of γ -PGA with active ingredients as moisturizing enhancement in facial cream



Adding **3%** of **compound γ -PGA HM and LM** at a ratio of **1:1** can enhance the moisturizing effect and synergistically improve the effect of active ingredients in facial cream.

Efficacy – Long Lasting Moisturisation – HM vs LM



HM – Stronger winding effect between molecules. As the molecule network becomes larger it forms a **protective film** on the skin surface to prevent loss of moisture. Improves skin humidity and elasticity. Due to its unique molecule structure γ -PGA (HM), it can **absorb and retain skin moisture efficiently**. It enhances skin smoothness, reduces wrinkles and improves elasticity of skin.

LM – nourishes the deep layers of skin by locking moisture and nutrients.

Efficacy – Synergy Effect

Increases the moisture of skin and participates in the metabolic activity of skin to improve the health condition of skin.

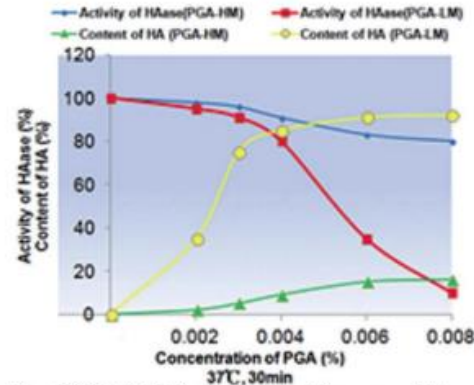


Fig.6 PGA inhibits HAase and improves HA

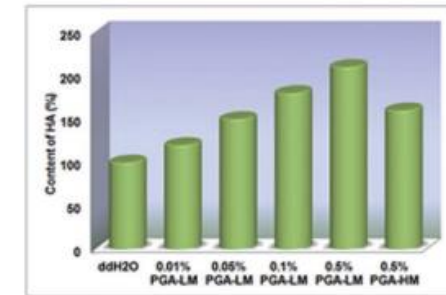


Fig.7 Promotion of HA by different dosage of PGA

Increasing and Maintaining HA of Skin

Hyaluronic Acid (HA) → Basic component of skin → locks the moisture of the skin and maintain its elasticity.

HA hydrolyzed very quickly by hyaluronidase (Haase) of skin.

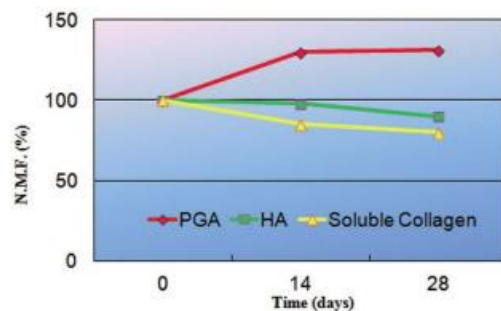
γ -PGA inhibits the activity of HAase and increases and maintains HA in skin. γ -PGA (LM) can effectively inhibit the HAase in skin. Increase γ -PGA (LM) → Increase HA content

It can improve skin moisture, elasticity and skin appearance in a synergistic manner.

Efficacy – Synergy Effect

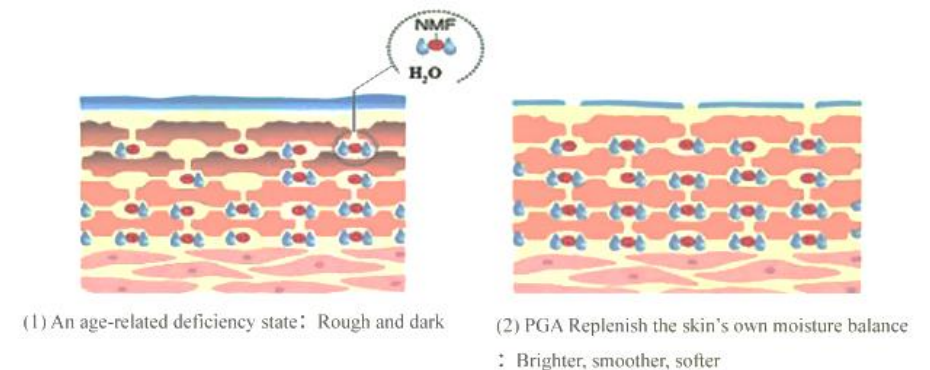
Effectively increases NMF in inner skin

Natural Moisturizing Factor (NMF) → Hygroscopic material produced by skin, provides moisture for skin in cuticle. The NMF including amino acids which are hydrolyzed from skin matrix protein (e.g. Filament aggregating protein), pyrrolidone carboxylic acid (PCA), lactic acid and urocanic acid (UCA) can retain moisture of skin.



Comparison of PGA, HA and Collagen in effect on N.M.F.

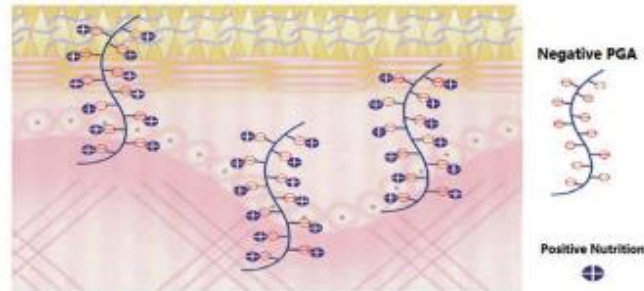
The only effective ingredient that is known till now to induce the production of NMF to 130% of the normal level. Locks the moisture in inner skin by promoting the growth of fibroblast and increasing the content of NMF in horn cells.



LM γ -PGA increases the production of NMF which further enhances the **internal moisturizing ability** of skin.

Efficacy – Improving Nutrient Supply

- Able to **control the release** of nutrients and moisture in a continuous manner.
- Each γ -PGA monomer has ionized groups like α -COOR, -CO and -NH, which can absorb electropositive nutrients, see figure. Hence, a **good embedding delivery system** is created and **active ingredients in cosmetics can possibly maximize their efficacy**.



PGA absorb the electropositive nutrients to nourish skin

Efficacy – Whitening

- Controls melanin synthesis to prevent and reduce freckles.

Ultraviolet irradiation is the main incentive of tyrosinase, which in turn induces the formation of Melanin. Table shows the inhibition effect of gamma PGA, Kojic acid and Vc on tyrosinase. As it shows, γ -PGA HM (0.5%) or LM (0.5%) can effectively inhibit the formation of melanin. Forms a film upon surface of skin which fences out ultraviolet.

Sample	0.5% γ -PGA (Na+,HM)	0.5% γ -PGA (Na+, LM)	1% Kojic Acid	1% Vc
Melanin Inhibition(%)	31.5	51.5	99.8	98.3
Safety	Mild and safe		Irritant	Relapse
Stability	UV-resistant		Broken and invalid under UV or oxidants	

Effect of γ -PGA on the inhibition of melanin biosynthesis



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