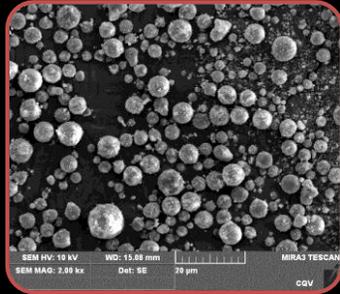
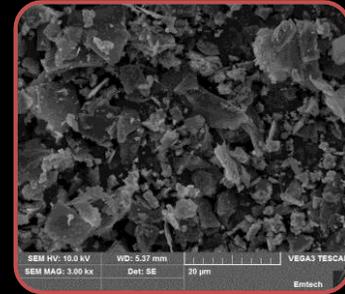


**Introducing NIR Block Powders:** New cosmetic powders comprised of metal oxide-coated PMMA (P/M) or Talc (T/M) to provide protection against damaging Infrared radiation:



**NIR Block Powder PMMA (P/M)**



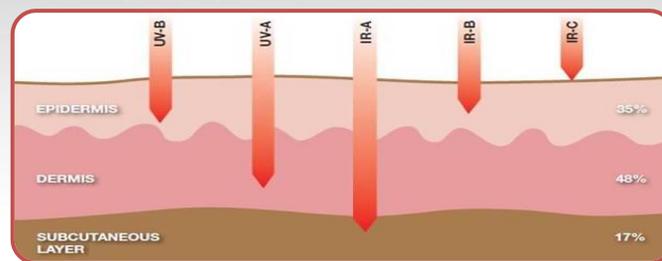
**NIR Block Powder Talc (T/M)**

**Infrared Radiation (IR)** consists of wavelengths from 760nm to 1mm

- IR-A, also known as “Near IR” (760-1400nm)
- IR-B (1400-3000nm)
- IR-C (3000-1mm)

Heat is a form of energy that may be transmitted by IR radiation which results in raised skin temperature (increased more than 40°C). The main parameter transfer to heat is IR-A/Near IR

### Penetration of UV and IR rays into skin



### Near Infrared Radiation

- Occupies 1/3 of entire solar radiation intensity
- The most deeply penetrate dermis and subcutaneous layer as well as epidermis
- Induces skin injuries such as aging and inflammation.(similar to UV)
- Induces the increase of metalloproteinase(MMPs)
- Induces the decrease of type-1 collagen
- Recently, been reported to be involved in carcinogenesis as well as photo-aging

Testing shows that using P/M or T/M inhibited IR-induced increases of MMP-1, MMP-3 and MMP-9, and IR-induced decreases of type 1 and 4 procollagen in a dose-dependent manner in dermal fibroblasts. In addition, using both P/M and T/M blocked the increase of cell media temperature induced by IR lamp. This suggests that P/M or T/M can inhibit decrease of collagens by blocking IR-induced heat transmission in human dermal fibroblasts

### Metal oxide-coating PMMA or Talc as a new IR blocker inhibits IR-induced decrease of collagens in human dermal fibroblasts

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Keywords: infrared, MMPs, procollagens, skin aging, IR blocker

#### OBJECTIVES:

The purpose of this study was whether P/M or T/M inhibits IR-induced decrease of collagens in human dermal fibroblasts, using P/M or T/M blocked near-IR (NIR) transmittance significantly in spectrophotometer measurement.

#### METHODS:

As metal oxides are effective inorganic molecules for intercepting IR radiation, we have developed metal oxide-coating PMMA (P/M) or Talc (T/M) as a new IR blocker. Inhibitory effect of the new IR blocker on collagen degradation was measured by gene and protein expressions of procollagens and MMPs, respectively, in IR-irradiated Hs68 cell line.

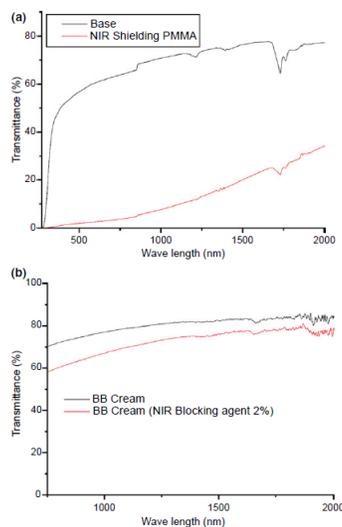
#### RESULTS:

Using P/M or T/M inhibited IR-induced increases of MMP-1, MMP-3 and MMP-9, and IR-induced decreases of type 1 and 4 procollagen in a dose-dependent manner in dermal fibroblasts. In addition, using both P/M and T/M blocked the increase of cell media temperature induced by IR lamp.

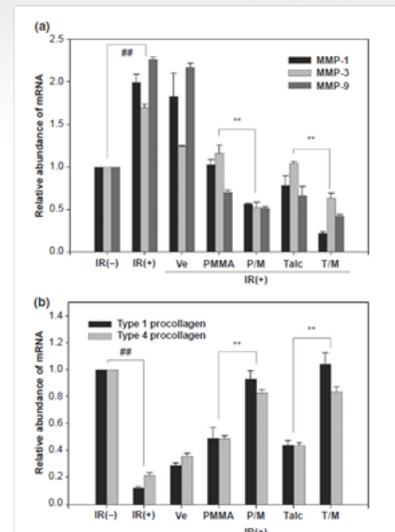
#### CONCLUSION:

The results suggest that P/M or T/M can inhibit decrease of collagens by blocking IR-induced heat transmission in human dermal fibroblasts.

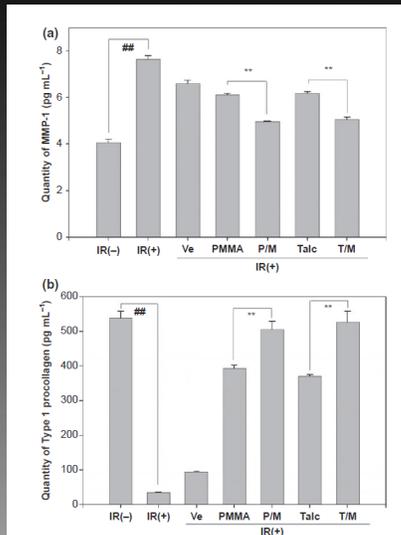
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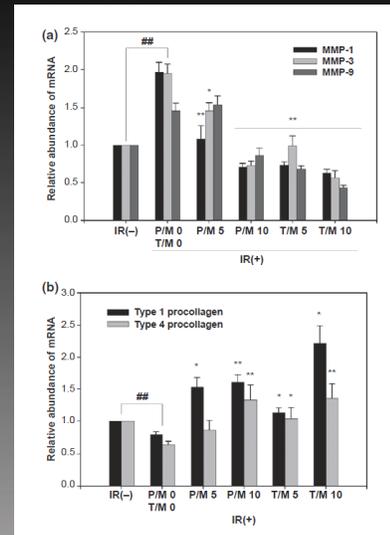
**NIR transmittance in spectrophotometers.** P/M was placed in a spectrophotometer by itself (a) and was formulated in BB cream before measurement (b).



**Effects of P/M or T/M in EtOH:1,3-BG (1 : 1) on MMPs (a) and procollagens (b) mRNA expression in Hs68 cells (n = 4).** PMMA or P/M was dispersed at 50%, and Talc or T/M was dispersed at 25%. Both increase of MMP-1, MMP-3 and MMP-9 and decrease of type 1 and 4 procollagen induced by IR irradiation were inhibited by P/M or T/M effectively. Ve: vehicle (EtOH:1,3-BG). ##p < 0.01 indicate a significant difference from IR-negative control. \*\*P < 0.01 indicates a significant difference from each raw material (PMMA vs. P/M, Talc vs. T/M).



**Effects of P/M or T/M in EtOH:1,3-BG (=1 : 1) on MMP-1 (a) and type 1 procollagen (b) protein expression in Hs68 cells (n = 4).** PMMA or P/M was dispersed at 50%, and Talc or T/M was dispersed at 25%. Both increase of MMP-1 and decrease of type 1 procollagen induced by IR irradiation were inhibited by P/M or T/M effectively. Ve: vehicle (EtOH:1,3-BG). ##p < 0.01 indicate a significant difference from IR-negative control. \*\*P < 0.01 indicates a significant difference from each raw material (PMMA vs. P/M, Talc vs. T/M).



**Effects of P/M or T/M included in formulas on MMPs (a) and procollagens (b) mRNA expression in Hs68 cells (n = 4).** A total of 5 or 10%, P/M or T/M are dispersed in gel-type formulas, respectively. ##p < 0.01 indicate a significant difference from IR-negative control. \*P < 0.05, \*\*P < 0.01 indicate a significant difference from 0% of P/M and T/M control.

IR(+) Time	Vehicle	PMMA (50%)	P/M (50%)	Talc (25%)	T/M (25%)
15 min	48.75 +/- 0.48	44.25 +/-0.25	37.75 +/-0.25**	45.5 +/- 0.29	39.75 +/-0.48**
20 min	50.75 +/-0.48	45 +/-0.41	37.5 +/-0.29**	47.25 +/-0.48	40.25 +/-0.48**

**Effects of P/M or T/M in EtOH:1,3-BG (=1 : 1) on changes in the cell media temperature:** A total of 50% of P/M or 25% of T/M was applied on top of cell culture plates compared with PMMA or Talc, respectively. EtOH:1,3-BG(=1 : 1) was also applied on top of cell culture plate and measured as a vehicle. The media temperature was measured after each plate was exposed to an IR lamp for 15 or 20 min. \*\*P < 0.01 vs. PMMA or Talc.

### AVAILABLE GRADES

	ARG-Sphere NIR BP1000	ARG-Sphere NIR BP1000 AS	ARG-Sphere NIR BT1000	ARG-Sphere NIR TiO2	ARG-Sphere NIR ZnO	ARG-Sphere NIR-1/15BA000
Description	Metal oxide treated spherical PMMA	Hydrophobic, Metal oxide treated spherical PMMA	Metal oxide treated Talc	Metal oxide treated Titanium Dioxide	Metal oxide treated Zinc Oxide	Metal oxide treated spherical PMMA 8-10 microns
INCI	PMMA Cerium Oxide Aluminum Oxide	PMMA Cerium Oxide Aluminum Oxide Alkylsilane	Talc Cerium Oxide	Titanium Dioxide Cerium Oxide	Zinc Oxide Cerium Oxide	PMMA Cerium Oxide Aluminum Oxide
	<ul style="list-style-type: none"> <li>It easy to formulate for O/W and W/O type</li> <li>Water or Oil dispersible</li> <li>Smooth feel</li> <li>For use in personal care, sun care &amp; makeup</li> </ul>	<ul style="list-style-type: none"> <li>Oil dispersible</li> <li>It easy to formulate for O/W and W/O type</li> <li>Water or Oil dispersible</li> <li>Smooth feel</li> <li>For use in personal care, sun care &amp; makeup</li> </ul>	<ul style="list-style-type: none"> <li>It easy to formulate for O/W and W/O type</li> <li>Water or Oil dispersible</li> <li>For use in personal care, sun care &amp; makeup</li> </ul>	<ul style="list-style-type: none"> <li>It easy to formulate for O/W and W/O type</li> <li>Water or Oil dispersible</li> <li>Broad Spectrum SPF</li> <li>For use in personal care, sun care &amp; makeup</li> </ul>	<ul style="list-style-type: none"> <li>It easy to formulate for O/W and W/O type</li> <li>Water or Oil dispersible</li> <li>Broad Spectrum SPF</li> <li>For use in personal care, sun care &amp; makeup</li> </ul>	<ul style="list-style-type: none"> <li>Enhanced NIR protection</li> <li>It easy to formulate for O/W and W/O type</li> <li>Water or Oil dispersible</li> <li>Smooth feel</li> <li>For use in personal care, sun care &amp; makeup</li> </ul>

The information provided is to our best present knowledge correct and complete and is given in good faith but without warranty. It remains the user's own responsibility to make sure that the information is appropriate and complete for his special use of this product.

January 24, 2019 rev