

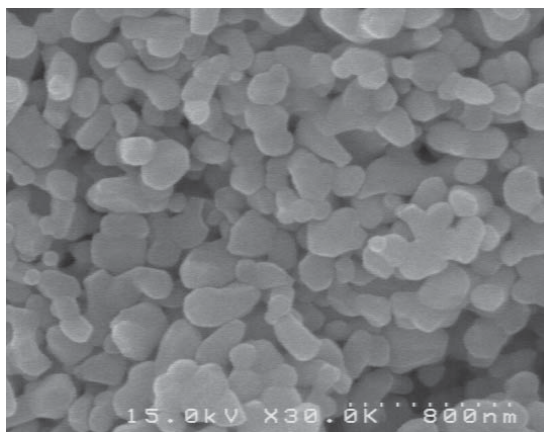
Non-Nano Zinc Oxide Sunscreen Technologies

Inorganic UV filters have been manufactured during the past twenty-five years for use in sunscreen products. They are preferred over chemical sun filters because of their physical and chemical stability, as well as their non-irritating properties. In order to be transparent on the skin and effective against UV light, Zinc Oxide with particle sizes less than 100nm, or “nanoparticles,” have become increasingly popular. However, there are recent safety concerns surrounding “nanoparticles,” particularly skin penetration, risk of inhalation, eco-toxicity, and bioaccumulation in the human body. In light of perceived health risks associated with “nanoparticles,” pigment producers have been challenged to develop particles over 100nm, while maintaining adequate UV-protection and cosmetic acceptability. Kobo offers a range of Zinc Oxide, where the primary particle sizes are greater than 100nm when measured by image analysis. These non-nano ZnO are available coated with either organic or inorganic surface treatments, and/or dispersed in various vehicles for easier use in formulation

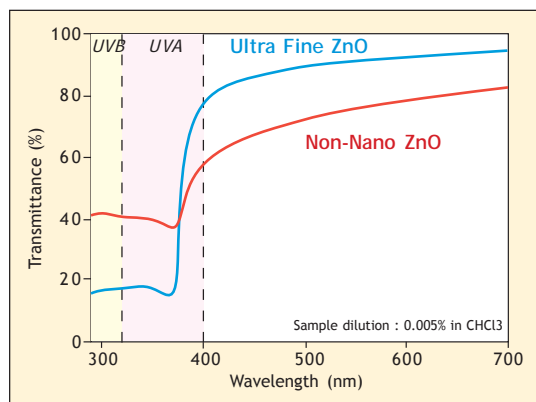
compositions. They will help formulators develop sunscreen products with high SPF/PFA and transparency without nanoparticles.

Kobo Non-Nano Patent Information:

U.S. Patent Application No.: 12/331,593 for Zinc Oxide Aqueous and Non-Aqueous Dispersions including its making and use in sun care product.

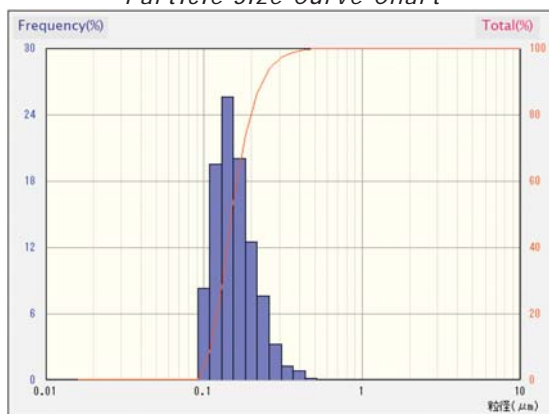


SEM of Treated ZnO-C



Comparison of the transmittance curves of Non-Nano ZnO, ZnO-C (red curve) and an ultra fine grade Zinc Oxide (blue curve) in dispersions.

Particle Size Curve Chart



In Vitro Test Results of Formulated Zinc Oxides

	ZnO-350 (attenuation grade)	ZnO-C
SPF	28.6	24.4
UVA Ratio	0.80	0.80

* Data from Sumitomo Osaka Cement



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Non-Nano ZnO

Powders

Product Name	Surface Treatment	Properties
ZnO-C	None	Hydrophilic
ZnO-C-I2	Isopropyl Titanium Triisostearate	Lipophilic
ZnO-C-NJE3	Jjoba Esters	Hydrophobic
ZnO-C-DMC2	Hydrogen Dimethicone	Hydrophobic
<small>New</small> ZnO-C-DS4	Dimethicone	Hydrophobic

Dispersions

Carrier/Solvent	Product Name	INCI Name	Active Content	Viscosity
Esters/Oils	TNPB80MZCM	Zinc Oxide (And) C12-15 Alkyl Benzoate (And) Isopropyl Myristate (And) Polyhydroxystearic Acid (And) Stearalkonium Hectorite (And) Hydrogen Dimethicone (And) Silica (And) Propylene Carbonate	78%	Paste
	GC70MZCJ	Zinc Oxide (And) Caprylic/Capric Triglyceride (And) Jojoba Esters (And) Silica	68%	Paste
Natural Esters/Oils	JOP80MZCJ	Zinc Oxide (And) Simmondsia Chinensis (Jojoba) Seed Oil (And) Polyhydroxystearic Acid (And) Jojoba Esters	78%	Paste
Volatile Non-D5	CMX80MZCM	Zinc Oxide (And) Cyclopentasiloxane (And) Dimethicone (And) PEG/PPG-18/18 Dimethicone (And) Hydrogen Dimethicone	78%	Paste
	DM2X80MZCM	Zinc Oxide (And) Trisiloxane (And) Dimethicone (And) PEG/PPG-18/18 Dimethicone (And) Hydrogen Dimethicone	78%	Paste
	MTMX80MZCM	Zinc Oxide (And) Methyl Trimethicone (And) Dimethicone (And) PEG/PPG-18/18 Dimethicone (And) Hydrogen Dimethicone	78%	Paste

The method of measurement used to classify these products as Non-Nano is the Image Analysis method.

Sunscreen with Non-Nano Zinc Oxide

Formula KSL-200A

Part 1

- Deionized Water - Water 53.90%
- Liposorb® L-20 - Lipo Chemicals: Polysorbate 20 1.00%

Part 2

- Propylene Glycol - Symrise: Propylene Glycol 1.50%
- KELTROL® CG - CP Kelco: Xanthan Gum 0.30%

Part 3

- HALLBRITE® BHB - Hallstar: Butyloctyl Salicylate 7.50%
- Neo Heliopan® AV - Symrise: Ethylhexyl Methoxycinnamate 7.50%
- **ZNO-C-DMC2** - Kobo Products: Zinc Oxide (And) Hydrogen Dimethicone 7.50%
- Ceraphyl® 368 - ISP: Ethylhexyl Palmitate 7.00%
- Lipo® GMS-450 - Lipo Chemicals: Glyceryl Stearate 3.00%
- Neo Heliopan® BB - Symrise: Benzophenone-3 3.00%
- Finsolv® TN - Finetex: C12-15 Alkyl Benzoate 2.50%
- Lipomulse® 165 - Lipo Chemicals: Glyceryl Stearate (And) PEG-100 Stearate 2.00%
- Covi-ox® T-50 - Cognis Corp.: Tocopherol 0.50%
- Lipowax® D - Lipo Chemicals: Cetearyl Alcohol (And) Cetareth-20 0.50%
- Liposorb® TS - Lipo Chemicals: Sorbitol Tristearate 0.30%

Part 4

- Botanistat PF-64 - DD Chemco: Phenoxyethanol (and) Caprylyl Glycol (and) Ethylhexylglycerin (and) Hexylene Glycol 1.00%

Part 5

- Aculyl™ 44 - Rohm & Hass: PEG-150/Decyl Alcohol/SMDI Copolymer 1.00%



Manufacturing Procedure

1. In main kettle, combine Part 1 ingredients and heat to 78-80°C.
2. Combine Part 2 ingredients and heat to 80°C. Mix until uniform using propeller mixer.
3. Add Part 2 to Part 1 and mix until uniform.
4. Combine Part 3 ingredients. Heat to 80°C and add to batch with propeller mixing.
5. Add Part 4 while cooling.
6. Homogenize for approximately 2 minutes at 4000 rpm.
7. Add Part 5 to batch.
8. Homogenize for approximately 1 minute at 4000 rpm.
9. Cool batch to 30°C.

Description

This sunscreen contains Kobo's Non-Nano Zinc Oxide Powder ZnO-C-DMC2. This sunscreen also contains organic sunscreens for broad spectrum.

Active Ingredient(s)

Zinc Oxide	7.35%
Benzophenone-3	3.00%
Ethylhexyl Methoxycinnamate	7.50%

Broad Spectrum Protection

Formulation Guidelines

Estimation of Use Level for SPF/UVA-PF
 SPF Units: 0.8 SPF / % ZnO
 SPF/UVA-PF <3
 Critical Wavelength > 370nm

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