© 2024 IJRTI | Volume 9, Issue 5 | ISSN: 2456-3315

Formulation And Evaluation of Herbal Sunscreen Gel

[1]Ms. Sonali Khandu Jathar, [2]Ms. Vaishnavi. S. Sake, [3]Dr. Amol Navnath Khedkar, [4]Ms. Deepali Dattatray Shinde

[1.4]Student, [2]Assistant professor, [3]principal
Department of Pharmaceutical science
Organization Saikrupa Institute of Pharmacy
Ghargaon, Shrigonda, Ahmednagar, Maharashtra 413728.

Abstract– **Herbal cosmetics in a tremendous demand in the market due to their unique properties and minimal side effects. The popularity of herbal cosmetics is mainly due to the effect produced by herbal cosmetics is mainly due to the effort produce by herbal extract used and it's inherent suitability of routine used in daily life. Herbal cosmetics also avoid adverse effect compared to synthetic product. Herbal extract show remarkable photo protection owing to their ability to absorb ultraviolet (uv) rays and antioxidant, anti-inflammatory , and anti-modulatory properties. Moreover, herbal cosmetics after the mean of less costly product compared to synthesis ones. Therefore aim of the present study was to formulate and evaluate cost effective herbal sunscreen gel containing latex of leaves aloe Barbadensis, Family-Liliaceae, Curcuma longa root, Family-Zingiberaceae, sunflower oil and rose water. Sunscreen is a short of product against the sun harmful by containing ultraviolet radiation (uv) rays which divided into two types. Ultraviolet radiation A(UVA) And ultraviolet radiation B(UVB). Neutral substance extracted from plant have recently considered as potential sunscreen resources owing to high ultraviolet ray absorption and anti-oxidant activity. The decrease in the intensity of uv radiation reaching the skin through sunscreen may reduce the risk of sun induced skin cancer.**

Keywords: **Herbal gel, Herbal sunscreen gel, sun protection factors (Spf), uv protection.**

INTRODUCION

Herbal sunscreen (also known as herbal sunscreen blocks) is a lotion spray or other topical product that help protect the skin from the sun ultraviolet radiation and which reduced sun burn and other skin damage with the goal of lowering the risk of the skin cancer with help of herb. Sunscreen are used to protect the skin from harmful effects of the sun including the appearance of erythema in the short term and actinic photo-ageing and skin cancer is long term. The efficacy of sunscreen is usually expressed by the sun protection factors(SPF) which defined as a uv energy required for producing a minimal erythema dose MED to protect skin. Divided by the uv energy required for producing med on unprotected skin.

SPF – Minimal erythema dose in sunscreen protected skin By Minimum erythema dose in non – sunscreen protected skin.

PHOTO PROTECTION

Sunscreen alone may provide insufficient protection from UVR sunscreen function best to prevent suburban from UVB radiation and then poorly sun avoidance remains the most desirable from of sun protection.

SPF – Sun protection factors -Sun protection factors is used sun protection factors and its system is used world wide to determine how much protection a sunscreen provide applied to the skin at a thickness of 2mg/cm2

SPF = MED with sunscreen By MED without sunscreen.

Due to Sunscreen has Cell – liked Its Recently Become Multiple skin health advantage Of the most Personal Care Product An Addition To Being Sold Separately Sunscreen Can Also Found in other Item Including those For the Personal care Shin hair, Lips ,and Eyes Although it gives us life. And energy

The Sun May also Damage our skin Sunlight Ultraviolet (uv) rays can the Result in Sunburn skin Cancer, And Early Ageing of the Skin. Sunscreen Shield The Skin From These UV rays Negative From Consequences By Preventing ,Reaching. It Include natural Component Can regenerate .The skin And give enough protection against Pollution And Climate change in the Atmosphere. The Most Often Used herbs its Natural Sunscreen Include Aloe Vera, Turmeric and Sunflower oil. Aloe Vera is Well know And Ancient Liliaceae medicine plant .Aloe Vera Extract include lot Them Of polyphenol component and chemical in Aloe Vera contain is potentially active, Element include vitamin supplement mineral And amino acid. It was successfully treated Sunburn including both first and Enzymes Treated Second degree burn: Turmeric extract

Anti - flatulent And Anti - inflammatory, anti-fungal,Anti-cancer properties. Is Contain vitamin E & Antioxidant And Sunflower Fat -soluble ,Photo protective capabilities . In the present research herbal Sunscreen was Prepared using

Carbapol 934base ,Sunflower oil base with different herbal ingredient. Colour, viscosity spread ability, thermal Stability, in vitro.Occlusion and Stability Of Fabricated Sunscreen gel Were was examined By using vitro Approach Of the gel. The Sun Protection efficacy Was Assessed in Term of SPF.

SUNSCREEN GEL FOR SKIN

SKIN ANATOMY –As the body's largest organ, skin protects against germs, regulates body temperature and enables touch (tactile) sensations. The skin's Main layers include the epidermis, dermis and hypodermis and is prone to many problems, including skin cancer, acne, wrinkles and Rashes. The outer layer of the skin has cells that contain the pigment melanin. Melanin protects skin from the sun's ultraviolet rays. These can Burn the skin and reduce its elasticity, leading to premature aging. People tan because sunlight causes the skin to produce more melanin And darken.

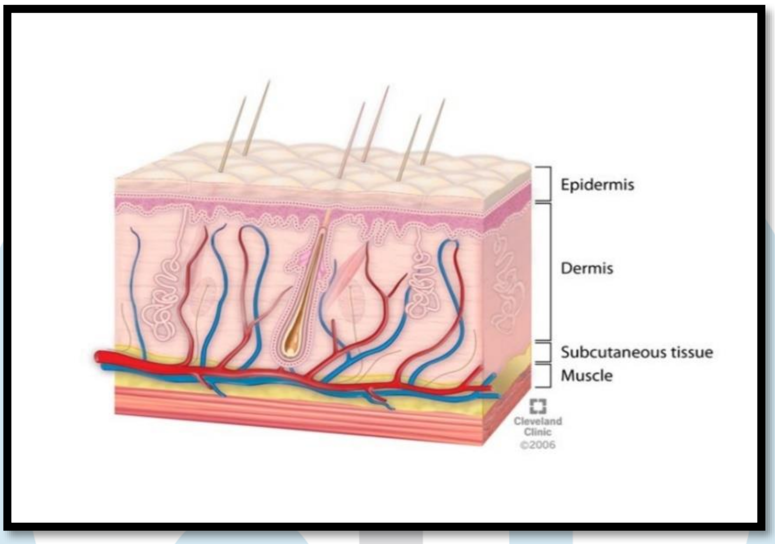

FIGURE: ANATOMY OF SKIN

Three layers of tissue make up the skin:
1] Epidermis, the top layer.
2]Dermis, the middle layer.
3]Hypodermis, the bottom or fatty layer.

• Acts as a protective barrier: The epidermis keeps bacteria and germs from entering your body and bloodstream and causing Infections. It also protects against rain, sun and other elements.
• Makes new skin: The epidermis continually makes new skin cells. These new cells replace the approximately 40,000 old Skin cells that your body sheds every day. You have new skin every 30 days.
• Protects your body: Langerhans cells in the epidermis are part of the body's immune system. They help fight off germs and Infections.
• Provides skin colour: The epidermis contains melanin, the pigment that gives skin its color. The amount of melanin you have Determines the colour of your skin, hair and eyes. People who make more melanin have darker skin and may tan more quickly.

MATERIAL AND METHOD —

SUNFLOWER OIL - is a beneficial ingredient to include in sunscreen gel. It can help to improve the Spf. Water resistance Spreadability and moisturizing properties of the sunscreen. It is important to note the oil has not high Spf on its own. It is recommended to use a sunscreen with Spf of 30 or higher. Even if contain sunflower oil.

FIGURE — SUNFLOWER OIL

TURMERIC EXTRACT —

Turmeric and aloe Vera sunscreen is a perfect natural remedy which protect your skin from the bacteria caused by excess swat in summer months.

FIGURE : TURMERIC EXTRACT

ALOE VERA

Aloe Vera is widely acknowledged to possess the anti-inflammatory, anti-microbial, and wound healing effects. A great moisturizer may cause burning skin. Alovera can lead in the defence of the skin against the damaging ultraviolet uv radiation of the sun by absorbing some of the radiation. • Kingdom :Plants – Plants

FIGURE : ALOEVERA

• **Subkingdom:** Tracheobionta – Vascular plants
• **Super division** :Spermatophyte – Seed plants
• **Division** :Magnoliophyte – Flowering plants
• **Class** Liliopsida :Monocotyledons
• **Subclass**: Liliidae
• **Order**: Liliales
• **Family** Aloaceae – Aloe family
• **Genus** Aloe L. – aloe P
• **Species**: Aloe Vera (L.) Burm. F. – Barbados aloe P
• **Chemical constituents** : Vitamins: It contains vitamins A (beta-carotene), C and E, Which are antioxidants.

TRIETHANOLAMINE – it is stabilizer and surface active agent. Thickener. When viscous Trimethylamine is added to a product, it adds body and density to the formula's feel.

FIGURE : TRIETHANOLAMINE

ZINC OXIDE

Must be applied to skin surface where it all reflect, scatter and absorb ultraviolet ray. Sunscreen with zinc oxide can lid in preventing skin cancer because uv radiation is the primary cause of the disease.

FIGURE : ZINC OXIDE

METHYL PARABEN – Use as preservative in the sunscreen gel. Effective at preventing microbial growth and bacterial.

Figure : Methyl paraben

ROSE WATER— Rose water has vitamin E in it. Which often used in the sunscreen. And after sun product, as it help to boost the effectiveness of the Spf.

FIGURE : ROSE WATER.

GLYCERINE— can be found in some sunscreen as natural moisturizer and to help make sunscreen more spreadable

FIGURE : GLYCERINE

CARBAPOL 934 — it is a gelling agent. Carbapol is made use of in some sunscreen products to help its product stay on the skin and Provide even coverage. It also can help to improve the product's water.

FIGURE — CARBAPOL 934

METHOD

MAKING OF ALOEVERA GEL —

- The gel base is prepared by dispersing carbomer 940 in distilled water at 80 degree Celsius. With constant stirring and ph was adjusted to 6-7using triaethanolmine. Clear mucilaginous gel was scooped with spoon.
- Extract was mixed uniformly with magnetic stirrer and extract filter with filter paper, finally transferred into sterilized glass stored in refrigerator.
- Gel extract add into gel base using aloe extract was prepared.

PREPARATION :

PREPARED SUNSCREEN WITH CARBAPOL 934 BASE

- Herbal sunscreen were prepared by combining several herbs with carbapol 934 as a foundation.
- One gm of carbapol was soaked with distilled water.
- Additionally component such as aloe Vera gel, turmeric, triaethanolmine, rose water, glycerine, was add and mixed continuously.
- For one hour before adding the preservative.

PREPARED SUNSCREEN WITH THE SUNFLOWER OIL BASE

- In a water bath required a amount of sunflower oil, turmeric extract.
- Heated for 1hour.
- The oil phase at room temperature other ingredients are aloe Vera , rose water, glycerine adding with stirring constant.

Until homogenous mixture. Then preservatives added to combinations.

- Stored in cool place and evaluation.

FORMULATION TABLE

Sr. No	Ingredients	F1	F2	F3	F4
1	Carbapol 934	1gm	1.5gm	2gm	1gm
2	Aloe Vera	8 ml	9ml	7ml	8ml
3	Turmeric extract	2ml	2ml	2ml	1.5ml
4	Sunflower oil	2ml	1.5ml	1.5ml	2ml
5	Triaethanolmine	1ml	1ml	2ml	1ml
6	Methyl paraben	1ml	1ml	1.5ml	1ml
7	Zinc oxide	2ml	1.5ml	1ml	2ml
8	Glycerine	1ml	2ml	1.5ml	1.5ml
9	Rose water	2d	1d	1d	2d
10	Distilled water	q. s	q. s	q. s	q. s
11	Perfume	q. s	q. s	q. s	q. s

FORMULATIONS :

Formulation : 1

Formulation :2

Formulation :3

Formulation : 4

EVALUATION TEST :

[1]DETERMINATION SUN PROTECTION FACTORS —

Calculating the sun protection factors (SPF) may be used to determine how effective a sunscreen product is. It is sometimes referred to as difference between UV energy required to create minimum erythema dose (MED) on sunscreen applied human skin and the UV energy required to produce a unprotected skin.

SPF = MINIMAL ERYTHEMA DOSE FOR PPROTECTED SKIN BY

MINIMAL ERYTHEMA DOSE FOR UNPROTECTED SKIN

Formula : SPF = CF × EE × I (λ) × abs (λ)

Where: The SPF value can be calculated by multiplying the correction factor (CF), the erythema effect spectrum (EE), the intensity spectrum from the sun (I), and also the absorbance (Abs) of the gel sample.

[2]Spreadability test :

A key elements of a sunscreen is the spread ability indicator. It look at how quickly it spread and how much residue there after touching it. There is extra technique for the spread ability test that requires as to take sample of slide, apply sunscreen, place another slide to slide off. The time required to separate the slides it's how it defined.

Spreadability = WXL /T

Where

W=weight attached to the upper slide
L=stand for slide length
T = times taken in seconds
[3]PH TEST – for improved product stability and expression of sunscreen, the proper ph should be checked. After this for better accuracy this formulation was kept under observation in digital PH meter
[4]IRRITANCY TEST = An essential elements in the assessment exam irritating test. Topical ingredients applied on the skin can cause oedema and erythema as antagonist and hypersensitive. A standard 24-hour irritancy test should be run an reported.
[5]DETERMINATION OF VISCOSITY -the Brookfield viscometer is use to the test viscosity with the proper number of spindle selected. A 50ml beaker was used to until the spindle grove was dipped and the rpm was set herbal sunscreen viscosity was measured the sunscreen. The viscosity was completed using the factor obtained from the reading.
[6] HOMOGENEITY — By touching and looking at the sunscreen , we can quickly determined its homogeneity, consistency and roughness.
(7) STABILITY — The assessment procedure for sunscreen place a significant emphasis on the thermal stability. It is necessary to assess the sunscreen expression. Stability at increased temperature.
(8) IN VITRO—OCCLUSION STUDIES — skin occlusion in indicated by complete coverage of the skin surface the follow equation can be used to determination. The oculasive of herbal sunscreen.
Occlusive factor — (f) =(A-B) /A×100
Where, A= water loss without sample by water loss with sample.
(9) REMOVAL TEST – Sunscreen is applied to skin and in addition to other part therefore it should be simple to remove after use . The wearing sunscreen is use. The wearing sunscreen is increased by easy removed after use. Hence a removal test should be conducted and exported.

OBSERVATION :
ORGANOLEPEPTIC TEST :

Formula	**F1**	**F2**	**F3**	**F4**
Colour	Yellowish transparent	Whitish transparent	Whitish transparent	Whitish transparent
Odour	Characteristics	Characteristics	Characteristics	Characteristics
Homogeneity	Homogenous in nature	Homogenous in nature	Homogenous in nature	Homogenous in nature

EVALUATION TEST —

Formula	**F1**	**F2**	**F3**	**F4**
Spf value	14	18	22	27
Spreadability test(gm.cm/sec)	20.1	20.5	22.3	21.6
Feel test	Cool sensation	Cool sensation	Cool sensation	Cool sensation
Removal test	Easily removal	Easily removal	Easily removal	Easily removal
Ph test	6.20	6.21	6.00	6.75
Viscosity	170	180	183	190
Occultation test	60	75	73	66
Stability test	Stable in accelerated temperature	Stable in accelerated temperature	Stable in accelerated temperature	Stable in accelerated temperature
Irritancy test	No erythema	No erythema	No erythema	No erythema

RESULT:
The sun protection factor(Spf) off the sunscreen formulation was assessed. By measuring the quantity of uv light that the formulation was able to block, the Spf was calculated. The sunscreen Spf was high 27 which is good. It also has good Spreadability and it is easily removal and it is gives cool sensation effects. After applied on the skin and it not irritated. And ph is 6.75and Occlusion factor is 66 and stable in accelerated temperature.

DISCUSSION:
The Spf is the quantitative measurements of the effectiveness of a sunscreen formulation. To effective in preventing sunburn, a sunscreen product showed have a wide range of the absorbance between 290nm to 400nm . The result of this study demonstrates that an herbal topical sunscreen formulation Shield skin from uv rays. The formulation is safe and

good for skin because it manufactured with natural component. There are total four Formula , and F 4 has shown the best out comes when compared to other. In this herbal sunscreen its main ingredient aloe Vera, turmeric and sunflower oil has been used for centuries for its medicinal properties and it now being using in variety of beauty product including sunscreen.

However, it is important to note that herbal sunscreen may not be as effective traditional sunscreen. That contain chemical sunscreen ingredient. It is also important to choose a herbal sunscreen is safe and effective to way protect your skin from the sun.

CONCLUSION:

The current study aimed to create a stable herbal sunscreen with suitable herbal sunscreen with a suitable Spf. Those sunscreen with suitable Spf these herbal sunscreen have also been show to be non mutagenic.

Herbal sunscreen gel is containing a aloe Vera, turmeric and sunflower oil is safe and effective way to protect your skin from harmful uv rays of the sun. Aloe has great-anti-inflammatory and anti – oxidant properties. That can help to protect the skin. While sunscreen is sunflower oil is rich source of vitamin E Which also has antioxidant and anti-ageing property.

REFERENCES:

[1] A. Stary, C. Robert, and A. Sarasin, "Deleterious effects of Ultraviolet a radiation in human cells," Mutation Research/DNA Repair, vol. 383, no. 1, pp. 1–8, 1997.
[2] C. Antoniou, M. G. Kosmadaki, A. J. Stratigos, and A. D. Katsambas, "Sunscreens—what's important to know," Journal of The European Academy of Dermatology and Venereology, vol. 22, No. 9, pp. 1110–1119, 2008.
[3] S. E. Cross, B. Innes, M. S. Roberts, T. Tsuzuki, T. A. Robertson, And P. McCormick, "Human skin penetration of sunscreen Nanoparticles: in-vitro assessment of a novel micronized zinc Oxide formulation," Skin Pharmacology and Physiology, vol. 20,No. 3, pp. 148–154, 2007.
[4] V. C. Seixas and O. A. Serra, "Stability of sunscreens containing CePO4: proposal for a new inorganic UV filter," Molecules, vol. 19, no. 7, pp. 9907–9925, 2014.
[5] M. F. Bahia, Protecc¸ao Solar: Actualizac ˜ ¸ao˜ , Universidade do Porto, 2003.
[6] B. L. Diffey and J. Grice, "The influence of sunscreen type on Photoprotection," British Journal of Dermatology, vol. 137, no. 1,pp. 103–105, 1997.
[7] N. Sadrieh, A. M. Wokovich, N. V. Gopee et al., "Lack of Significant dermal penetration of titanium dioxide from sun-Screen formulations containing nano- and submicron-size TiO2 Particles," Toxicological Sciences, vol. 115, no. 1, pp. 156–166, 2010.
[8] B. Kiss, T. B´ıro, G. Czifra et al., "Investigation of micronized ´Titanium dioxide penetration in human skin xenografts and Its effect on cellular functions of human skin-derived cells," Experimental Dermatology, vol. 17, no. 8, pp. 659–667, 2008.
[9] S. Q. Wang, Y. Balagula, and U. Osterwalder, "Photoprotection:A review of the current and future technologies," DermatologicbTherapy, vol. 23, no. 1, pp. 31–47, 2010.
[10] N. Serpone, D. Dondi, and A. Albini, "Inorganic and organicvUV filters: their role and efficacy in sunscreens and sun care Products," Inorganica Chimica Acta, vol. 360, pp. 794–802, 2007.
[11] P. Su, H. Li, J. Wang, J. Wu, B. Zhao, and F. Wang, "Facile Preparation of titanium dioxide nano-capsule arrays used as Photo-anode for dye sensitized solar cells," Applied Surface Science, vol. 347, pp. 636–642, 2015.
[12] C. J. Brinker and G. W. Scherer, Sol-Gel Science: The Physics and Chemistry of Sol-Gel Processing, Academic Press, 2013.
[13] E. Scolan and C. Sanchez, "Synthesis and characterization of Surface-protected monocrystalline titania particles," Chemistry Of Materials, vol. 10, no. 10, pp. 3217–3223, 1998.
[14] R. C. K. Kaminski, S. H. Pulcinelli, C. V. Santilli, F. Meneau, S. Blanchandin, and V. Briois, "Thermo-reversible sol–gel transi-Tion of TiO2 nanoparticles with surface modified by p-toluene Sulfonic acid," Journal of the European Ceramic Society, vol. 30, No. 2, pp. 193–198, 2010.
[15] R. C. K. Kaminski, S. H. Pulcinelli, P. Judeinstein, F. Meneau, V. Briois, and C. V. Santilli, "Thermo-reversible sol−gel transition Of surface modified titanium poly oxo building blocks," Then Journal of Physical Chemistry C, vol. 114, no. 3, pp. 1416–1423,2009
[16] S. K. Jain and N. K. Jain, "Multiparticulate carriers for sun-Screening agents," International Journal of Cosmetic Science, vol.32, no. 2, pp. 89–98, 2010.
[17] T. S. de Araujo and S. O. de Souza, "Protectors' solares e os efeitos ´Da radiac¸ao ultravioleta," ˜ Scientia Plena, vol. 4, no. 11, Article ID 114807, 7 pages, 2008.
[18] J. Flor, M. R. Davolos, and M. A. Correa, "Protetores solares,"Qu´ımica Nova, vol. 30, no. 1, pp. 153–158, 2007.

[19] M. D. Gianeti, L. R. Gaspar, F. Bueno de Camargo Jr., and P. M. B. G. M. Campos, "Benefits of combinations of vitamin A, C and e Derivatives in the stability of cosmetic formulations," Molecules,Vol. 17, no. 2, pp. 2219–2230, 2012.

[20] T. Guaratini, M. D. Gianeti, and P. M. B. G. M. Campos, "Sta-Bility of cosmetic formulations containing esters of Vitamins E And A: chemical and physical aspects," International Journal of Pharmaceutics, vol. 327, no. 1-2, pp. 12–16, 2006.

[21] G. Baek and C. Kim, "Rheological properties of Carbopol Containing nanoparticles," Journal of Rheology, vol. 55, no. 2, pp.313–330, 2011.

[22] E. B. Manaia, R. C. K. Kaminski, C. P. Soares et al., "Liq-Uid crystalline formulations containing modified surface TiO2 Nanoparticles obtained by sol–gel process," Journal of Sol-Gel Science and Technology, vol. 63, no. 2, pp. 251–257, 2012.

[23] E. B. Manaia, R. C. Kaminski, A. G. de Oliveira, M. A. Correa, and L. A. Chiavacci, "Multifunction hexagonal liquid- ˆCrystal containing modified surface TiO2 nanoparticles and Terpinen-4-ol for controlled release," International Journal of Nanomedicine, vol. 10, pp. 811–819, 2015.

[24] H. Yang, S. Zhu, and N. Pan, "Studying the mechanisms of Titanium dioxide as ultraviolet-blocking additive for films and Fabrics by an improved scheme," Journal of Applied Polymer Science, vol. 92, no. 5, pp. 3201–3210, 2004.

[25] B. L. Diffey, P. R. Tanner, P. J. Matts, and J. F. Nash, "In Vitro assessment of the broad-spectrum ultraviolet protection Of sunscreen products," Journal of the American Academy of Dermatology, vol. 43, no. 6, pp. 1024–1035, 2000. [26] B. L. Diffey, "A method for broad spectrum classification of Sunscreens," International Journal of Cosmetic Science, vol. 16, No. 2, pp. 47–52, 1994.

[27] D. Nesseem, "Formulation of sunscreens with enhancement sun Protection factor response based on solid lipid nanoparticles," International Journal of Cosmetic Science, vol. 33, no. 1, pp. 70–79, 2011.

[28] N. S. Allen, M. Edge, A. Ortega, C. M. Liauw, J. Stratton, and R. B. McIntyre, "Behaviour of nanoparticle (ultrafine) titanium Dioxide pigments and stabilisers on the photooxidative stability Of water based acrylic and isocyanate based acrylic coatings," Polymer Degradation and Stability, vol. 78, no. 3, pp. 467–478, 2002.

[29] E. B. Manaia, R. C. K. Kaminski, M. A. Correa, and L. A. ˆChiavacci, "Inorganic UV filters," Brazilian Journal of Pharma-Ceutical Sciences, vol. 49, no. 2, pp. 201–209, 2013.

[30] N. M. Bahadur, T. Furusawa, M. Sato, F. Kurayama, and N.Suzuki, "Rapid synthesis, characterization and optical proper-Ties of TiO2 coated ZnO nanocomposite particles by a novel Microwave irradiation method," Materials Research Bulletin,Vol. 45, no. 10, pp. 1383–1388, 2010.

[31] A. Nasu and Y. Otsubo, "Rheology and UV-protecting prop-bErties of complex suspensions of titanium dioxides and zinc Oxides," Journal of Colloid and Interface Science, vol. 310, no. 2, pp. 617–623, 2007.