Gemstone Property Studies for Minerals Based Cosmetics and Beauty Applications

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Abstract: In this article, properties of various gemstones are investigated and discussed for the possibility of using as mineral based cosmetics usage. By using the separation technology, the single atom of various gemstones , for instance, Au and Ag are combined with tourmaline and some other gemstones, which can give the infrared spectrum and be useful for many applications, where in this work we concentrate on the gemstone optical properties that can be used incorporating the cosmetic materials and useful for surface usage. The optical properties such as absorption and transparent transmission, where the desired properties are suitable for cosmetic applications, which are also investigated and discussed in details.
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1. Introduction

Generally, there are three types of gemstones in record, firstly, they are mineral gemstones and found in rocks, where themselves are made up of one or more minerals. The three types of rocks are (i) igneous rocks, (ii) **sedimentary** rocks and (iii) metamorphic rocks. Secondly, organic gemstones-gemstones have their origin either from plants or from animals. Thirdly, they are synthetic gemstones are made in laboratories or factories. The important properties of gemstones that have to be accounted are (i) hardness, where the higher the hardness, more durable is the stone. Diamond is the hardest gemstone known and has been assigned hardness of 10 on Moh's scale of hardness, while the Talc has been given lowest hardness of 1 on this scale [1]. The gemstone hardness is rated in between 1 to 10, (ii) the specific gravity, which presents the density of the gemstone, where in common parlance it shows the weightiness of the gem. The greater the specific gravity, the heavier the gem will feel, (iii) the crystal shapes, this can give a definite clue about the gemstone internal structure and (iv) the optical properties, these are also used by researchers and experts to differentiate and decide about the ways of cutting and polishing the gems.

In cosmetics usage, optical material properties can be found in the form of material known as gemstones [1, 2], where there are broad selection of quality pearlescent micas, oxides, ultramarines and other ingredients used to formulate mineral makeup, where the beautiful blushes, bronzers, eye shadows, lip colors and more can be obtained by the mineral based cosmetics [3-5]. However, the desired gemstones are required to give two important properties for cosmetics, where one is the material separation that can be mixed(combined) minerals, for instance, Au or Ag to be the used ingredients, where the second one is the transmission(reflection) of light within the far infrared wavelength region, which can also be useful for therapeutic applications. In addition, the safety of gemstones with cosmetics usage is the very important issue that is needed to be accounted. Till date, there is not many research works in this area of research and investigation.

Materials based on optical properties have been the interesting and important materials for many applications, where the dominent properties of them are the transparent and dual properties, where the combination between electrical and optical properties are the keys of successfull usages. Firstly, the optical property is commonly used for the device that give light in broad spectrum, in which the various usages such as in medicine, healthcare and others [6-15] have been successfully implemented. Secondly, the use of electrical property is basically formed by the polarization of light within the device, in which the electrical property can be obtained and finally used. For instance, most of optical materials are required to change from optical property to electrical property by transferring from the polarization of light with in the device, however, there is one material family that can give the electrical properties directly, it is the graphene material family [16], which can lead to many applications for this decade.

In this article, we have proposed the use of gemstones in the far infrared wavelength region for

cosmetics applications. The use of Au and Ag where they are combined with tourmaline can be suitable for minerals based cosmetics [17, 18], where the infrared transmsision can be beneficial for therapeutic usage. In addition the safety issue is also given and discussed. To begin this knowledge, the basic background of gemstones that give the optical and electical properties are given in details. The safety of using minerals based cosmetics and beauty is also proposed and discussed with various methods and evidences.

2. Minerals Based Cosmetics and Beauty

Cosmetic textures are basically served the user requirements, however, they should offer a broad selection of quality pearlescent micas, oxides, ultramarines and other ingredients used to formulate mineral makeup. The criteria of using gemstones for cosmetics are particle sizes, physical properties and chemical properties that can be used for cosmetics, beauty and therapy. There are various gemstones that can offer the required properties, where they are tourmaline and some other gemstones, in which the far infrared(FIR) property can be obtained, which is in a powder form to make a mineral-based water prior to add Au & Ag nanoparticles, where the final output is the solution used. Since nanoparticles have been popularly used in cosmetics, which was reported by Yupapin and Suwandee [19], therefore, in this article we are going to concentrate on the combination between Au and Ag with the required gemstone properties, especially, the infrared wavelength region. The powder form of gemstones has been the suitable agents to add with the Au and Ag nanoparticle. Tourmaline is a crystalline boron silicat mineral compound with elements such as aluminium, iron, magnetism, sodium, lithium, or potassium, which is classified as semi-precious stone and the gemstone comes in variety of colors. There are found few locations in Thailand.

Infrared therapy can offer the non-operation treatment, which has been the popular method nowadays, where the various treatments in either inside or outside body can be formed, especially, for the treatment that requires heat to form the treatment. There are some evidences of infrared treatments have been reported [20-23]. For the surface treatment using tourmaline, the combination with Au and Ag is also interesting, in which the infrared transmission can be obtained by the tourmaline content within the mixture, which is available for heat treatment and therapy usage.

The suitable knowledge and technology that can be used to support the tourmaline for minerals based cosmetics and beauty can be described as following details. By using the same technique of drug delivery concept, the combination between Au or Ag and tourmaline can be formed, in which the atom size is only a slightly change, which means that the well known drug delivery technique can be implemented [13, 14, 19, 20]. In applications, the use of such contents such as internal, external and surface treatments can be done. The use for cosmetics is formed by the surface treatment can be described similarly to the recent reported work [19], where the internal and external treatments can also be used. The safety issue of using tourmaline in all aspects is also concerned, where so far there is no evidence of the risk in the environment.

3. Discussion and Conclusion

Tourmaline is claimed as the innert though the complex mineral. It has the piezoelectric property, which means that it generates an electrical charge when it is gone under pressure, so it can be used in pressure gauges. Tourmaline also has the pyroelectric property, where the electrical charge during a temperature change can be presented. Although, this is the concept paper based on the previous results, in which the use in technique can be done similarly to the Au and Ag particle usage. The electrical and thermal properties can give benefits for the applications such as cancer cells killer and acne treatments [23], while the magnetic property of particle has also been used in the magnetic sensors and therapy using the nano-scale device [24, 25]. Furthermore, there is no published research showing tourmaline has any proven effect on skin whatsoever.

In conclusion, we have presented the feasibility of using minerals based cosmetics and beauty, where the basic properties have been reviewed. The gemstone particle separation and mixture are discussed, where the interesting property that uses the infrared wavelength region is discussed for therapeutic usage. The safety of minerals based cosmetics and beauty is also proposed and discussed with various methods and evidences.

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