E-PROCEEDINGS

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"Fostering a Culture of Innovation and Entrepreneurial Excellence"

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PTDI, UiTM Cawangan Johor
Kampus Pasir Gudang

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Electrical Engineering Studies, College of Engineering
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A-ST117: FORMULATION OF NATURAL LIPSTICK USING COLOURANT AGENT DERIVED FROM ROSELLE (*HIBISCUS SABDARIFFA*)

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ABSTRACT

RosyGlam is a natural lipstick formulated using colorant extracted from the Roselle plant (*Hibiscus sabdariffa*), designed to address health concerns associated with synthetic cosmetics. The project aims to provide a safer alternative for consumers, particularly those with sensitive skin, by utilizing biodegradable and eco-friendly ingredients. Its unique formulation not only enhances beauty but also offers antibacterial properties, protecting lips from harmful pathogens. The innovation lies in its dual functionality as a beauty and wellness product, appealing to the growing demand for clean beauty solutions. RosyGlam's formulations have been rigorously tested for physical properties and safety, ensuring high standards of quality. The socio-economic impact includes promoting sustainable practices in the cosmetics industry, fostering consumer awareness about ingredient transparency, and supporting local agriculture through the use of natural resources. With increasing consumer preference for natural products, RosyGlam has strong commercialization prospects, positioning itself as a potential leader in the Green Beauty Movement. By merging aesthetics with health benefits, RosyGlam represents a significant advancement in cosmetics, contributing to both individual well-being and environmental sustainability.

Keywords: Cosmetics, Roselle, Lipstick formulation, Antibacterial, In-vivo reduction

1. Product Description

The primary feature of RosyGlam is its formulation that harnesses the vibrant colorant extracted from the Roselle plant (*Hibiscus sabdariffa*). **Table 1** shows how this innovative product is designed for clean beauty solutions, utilizing a blend of biodegradable ingredients, including castor oil, beeswax and shea butter. RosyGlam's formulations (as seen in **Figure 1**) have been rigorously tested to which it demonstrated excellent physical properties. RosyGlam's formulations have been rigorously tested, demonstrating excellent physical properties. Based on **Table 2**, the melting points of all formulations were found ranging from 47°C to 65°C, which is within the acceptable limit of designed lipstick. Besides that, **Figure 2** shows superior spreadability with minimal lipstick residue. RosyGlam is also considered gentle on the skin, which is ideal for users prone to allergic reactions. From both **Table 3** and **Table 4**, the product exhibits significant antibacterial activity, particularly against *Staphylococcus aureus*, with a zone of inhibition measuring 18.4 ± 3.6 mm, and achieving a 99.99% reduction in bacterial cells in in-vivo tests. With its commitment to ingredient

transparency and sustainability, RosyGlam represents a significant advancement in the beauty industry, promoting both individual well-being and environmental responsibility.

2. Prototype Development and Validation of Results.

Table 1. RosyGlam formulations.

Lipstick Formulation	***Quantity (g)***			***Pigment Extract (g)***
	Castor Oil	**Beeswax**	**Shea Butter**	
F1	15	5	1	2.5
F2	17	2	2	2.5
F3	15	3	3	2.5
F4	13	4	4	2.5

Figure 1. RosyGlam lipsticks with different concentrations of ingredients.

Table 2. RosyGlam lipsticks' melting points.

Lipstick Formulation	***Melting Point (°C)***
F1	47
F2	65
F3	55
F4	65

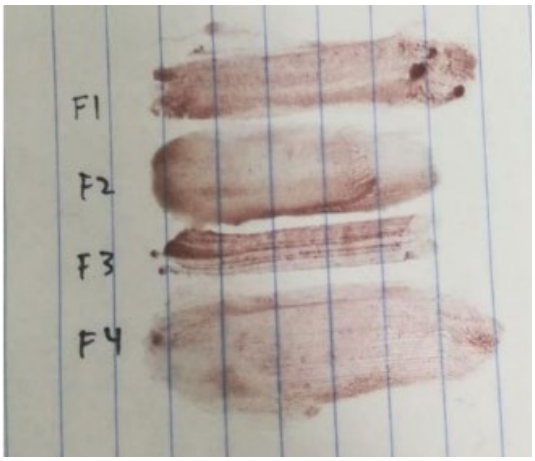

Figure 2. The spreadability of RosyGlam formulations colours on paper.

Table 3. Antibacterial activity of RosyGlam against test bacteria.

Test bacteria	***Zone of inhibition (mm)***
E. coli	11.7 ± 2.9
P. aeruginosa	15.0 ± 6.0
K. pneumoniae	13.7 ± 2.6
S. aureus	18.4 ± 3.6

Table 4. Bacterial reduction of RosyGlam against *S. aureus*.

Weight of lipstick (g)	***No. of bacteria after 24 hours***	***Bacterial reduction (R% ± SD)***
1	1.33 x 108	31.58 ± 0.01
2	1.33 x 108	78.20 ± 0.00
3	1.33 x 108	97.74 ± 0.02
4	1.33 x 108	99.99 ± 0.01

3. Novelty and Uniqueness

The formulation of RosyGlam set itself apart from traditional lipsticks, which rely on artificial pigments and chemicals, by using Roselle as the natural, plant-based colouring agent. This product stands out from the competition by providing a safer substitute while utilising

Roselle's vibrant colours. Aside from that, RosyGlam's formula is a fresh take on the market trends for clean beauty products, appealing to consumers who respect ingredient visibility. Furthermore, RosyGlam's anti-inflammatory and antibacterial qualities, in contrast to traditional lipstick formulas that may result in negative reactions, offer a number of health and cosmetic advantages. Since it gradually improves lip health without the need for additional substances to produce comparable results, this combination of wellness and beauty marks a significant leap in natural cosmetics. In addition, using biodegradable and renewable Roselle in the manufacturing of RosyGlam promotes sustainability. By lessening its effects on the environment, this strategy distinguishes the product in the cosmetics market and adds novelty in the context of Green Beauty Movements.

4. Benefit to Mankind

RosyGlam offers several societal benefits through its innovative approach to beauty products. By utilizing natural ingredients like Roselle extract, it prioritizes consumer health and safety, reducing reliance on harmful chemicals. This minimizes the risks of skin irritation, allergies, and long-term exposure to toxic substances. The antimicrobial properties of Roselle also provide added protection against pathogens in the lip area. Beyond health, RosyGlam aligns with the Green Beauty Movement by incorporating renewable and sustainable ingredients. This approach supports clean beauty trends, helping to reduce environmental damage caused by synthetic chemicals and unsustainable practices. It also encourages the beauty industry to explore underutilized natural resources, promoting a shift toward eco-conscious innovation. Economically, RosyGlam creates opportunities for local communities, as Roselle can be cultivated in various regions, including developing countries like Malaysia. This supports sustainable sourcing, stimulates local economies, and fosters growth in agricultural and cosmetic industries.

5. Innovation and Entrepreneurial Impact

RosyGlam exemplifies innovation by introducing a natural lipstick that utilizes colorant extracted from the Roselle plant, addressing health concerns linked to synthetic cosmetics. This product not only enhances beauty but also offers antibacterial properties, setting a new standard in the cosmetics industry. By prioritizing eco-friendly and biodegradable ingredients, RosyGlam aligns with the growing demand for clean beauty, fostering a culture of sustainability. The entrepreneurial impact of RosyGlam extends to local communities by promoting the use of indigenous resources, supporting local agriculture, and encouraging small-scale production. This initiative inspires aspiring entrepreneurs to explore natural product development, creating opportunities for economic growth. Furthermore, RosyGlam’s commitment to ingredient transparency and consumer education empowers individuals to make informed choices, cultivating a community that values health and sustainability. Overall, RosyGlam not only innovates within the beauty sector but also contributes to a vibrant entrepreneurial ecosystem focused on responsible and sustainable practices.

6. Potential Commercialization

RosyGlam has strong commercialization potential, aligning with current market trends and consumer preferences. It supports the growing Clean Beauty Movement, meeting the demand for natural and non-toxic cosmetics as consumers increasingly avoid harmful chemicals. The use of plant-based Roselle extract appeals to environmentally conscious buyers seeking sustainable and eco-friendly products, making it scalable and suitable for niche markets focused on reducing environmental footprints. RosyGlam also stands out with its unique selling point as a dual-purpose beauty and wellness product. Roselle's natural red pigment, combined with its antibacterial properties, sets it apart from conventional lipsticks, offering multifunctionality that enhances its appeal in the competitive cosmetic industry. These factors position RosyGlam as an innovative and market-relevant product, catering to the increasing preference for sustainable, health-focused beauty solutions.

7. Acknowledgment

The project is fully supported by the School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA (UiTM), Selangor Branch, Shah Alam Campus, Shah Alam, Malaysia.

8. Authors' Biography

Nurul Zahwa Fazwirah Zainol Fikri, a dedicated student from the Faculty of Applied Sciences at Universiti Teknologi MARA (UiTM) Shah Alam, is currently completing an internship at the prestigious Forest Research Institute Malaysia (FRIM). An aspiring Microbiologist with a passion for innovation, she has gained hands-on experience working with diverse microorganisms, including bacteria and fungi, while specializing in bioactivity experiments. Her Final Year Project served as a testament to her expertise in this field. She has consistently demonstrated remarkable leadership and academic excellence throughout her journey. She successfully led a project that earned faculty-wide recognition and has been celebrated for her exceptional contributions to various initiatives. Her commitment to excellence and dedication to advancing scientific research has significantly enhanced the reputation of UiTM's Faculty of Applied Sciences.

Nur Fadhlin Ainin Abdul Rahim is a student at the Faculty of Applied Sciences (FSG), Universiti Teknologi MARA (UiTM) Shah Alam. She has actively participated in various academic projects, demonstrating strong teamwork and dedication. Notably, she was part of a project team led by Muhammad Afiqamzar Azmi, Nurul Zahwa Fazwirah Zaino Fikri, and Ameer Hakeem Ahmad Nor, which received recognition from the faculty. Additionally, she has

contributed to presentations and academic discussions, showcasing her commitment to her field of study. Her involvement in these activities reflects her passion for applied sciences and her potential for future contributions to the field.

Muhammad Afiqamzar Bin Azmi is an intern at Melaka Biotechnology Corporation and a final semester student at UiTM Shah Alam, specializing in food and medical microbiology. He received the "Anugerah Tokoh Mahasiswa Keseluruhan" for the 2024 2nd session and earned an A+ for his final year project, maintaining first-class degree honors. Under Dr. Mohd Taufiq Mat Jalil, he has won gold, bronze, and consolation medals in various competitions at international, national, and UiTM levels. Active in sports and entrepreneurship, he completed professional training sponsored by Khazanah Nasional Berhad, earning a certificate in professional development.

Dr. Mohd Taufiq Mat Jalil is a Senior Lecturer at the School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA (UiTM), Shah Alam. He specializes in microbial biotechnology, enzymology, bacteriology, and microbial secondary metabolites. With a PhD in Microbial Biotechnology from Universiti Sains Malaysia (USM), his expertise spans enzyme technology, fermentation processes, and antimicrobial research. He has contributed significantly to academia through publications, seminars, and active involvement in research projects. His professional career includes roles as a researcher, educator, and reviewer for various scientific journals, reflecting his commitment to advancing microbiological sciences and applied research.