

**EFFECT OF MELANIN ON DIFFUSE REFLECTANCE
SPECTROSCOPY OF HUMAN SKIN TISSUE**

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ABSTRACT

EFFECT OF MELANIN ON DIFFUSE REFLECTANCE SPECTROSCOPY ON HUMAN SKIN TISSUE

Diffuse reflectance spectroscopy in the visible and near infrared spectral ranges is an effective and extensively used technique for non-invasive study and characterization of various biological tissues. The effect of melanin on diffuse reflectance spectroscopy of human tissue was studied in this research. To investigate this, diffuse reflectance spectra were collected from human skin at palm and back of hand of the sample since palm has thick epidermis and a few melanin pigments as compared to back of hand that consist many melanin pigment. Other than that, the temperature effect also considered in this investigation. The measurement was taken at room temperature and high temperature respectively with the small increment of temperature where the changes in temperature are sensed by the skin, which is well-designed to counteract these changes. Experimental results show that the general reduction in reflectance intensity observed from longer to shorter wavelengths is due to melanin absorption since melanin is the dominant chromophore responsible for the reflectance lineshape. As expected, back of hand has higher melanin absorption compared to palm, whereas the palm without melanin absorption. The diffuse reflectance spectrum exhibits a 'W' pattern between 530nm to 600nm wavelengths, which is an indication of observation of hemoglobin. The effect of temperature gives a gradual decrease of the reflectance spectrum from low temperature to high temperature. This is caused by fluctuation of blood when heat is applied on skin, blood supply to the skin increases again as the arterioles dilate. Exposure to heat causes blood vessels to dilate, allowing heat to dissipate from the skin's surface and resulting in a flushed or red appearance which affects the reflectance measurement.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The skin is the largest organ of the body with a total area about 20 square feet. Its heterogeneous organ that protects the body from pathogens (such as virus, bacterium or fungus) while sustaining microorganisms that influence human health and disease. The skin is a critical interface between the human body and external environment to prevent loss of moisture and barring entry of pathogenic organisms. The other functions of skin are to permits the sensations (such as touch, heat and cold), insulation, synthesis of vitamin D and the protection of vitamin B folates (essential for cell growth and reproduction).

Severely damaged on skin will try to heal by forming scar tissue. This is often discolored and depigmented. In humans, skin pigmentation varies among populations, and skin type can range from dry to oily.