VideometerLab for Skin Analysis

We measure what you see – and beyond

ABOUT US

- Spectral imaging company
- Founded 1999
- Products
  - Lab instruments,
  - Turn-key in-line systems, and
  - R&D projects
- App. 700 imaging R&D projects since 2000
- In-line 24/7 spectral imaging since 2002
- Based in Copenhagen, Denmark
- Partnerships worldwide

OUR LEGACY

1999

The beginnings

Videometer was co-founded by Jens Michael Carstensen and 7-Technologies in 1999, as a spin-off from the Technical University of Denmark. The first patent application was filed.

2000

Project-based

In 2000, Videometer began its project-based activity. During these years, the company's main focus was set on custom-made vision systems for in-line and on-line quality control.

2018

A new era

In 2018, Videometer's structure underwent new developments both in terms of strategy and structure. This year marked the beginning of a new era for the company, in terms of focus on instruments.

2020s

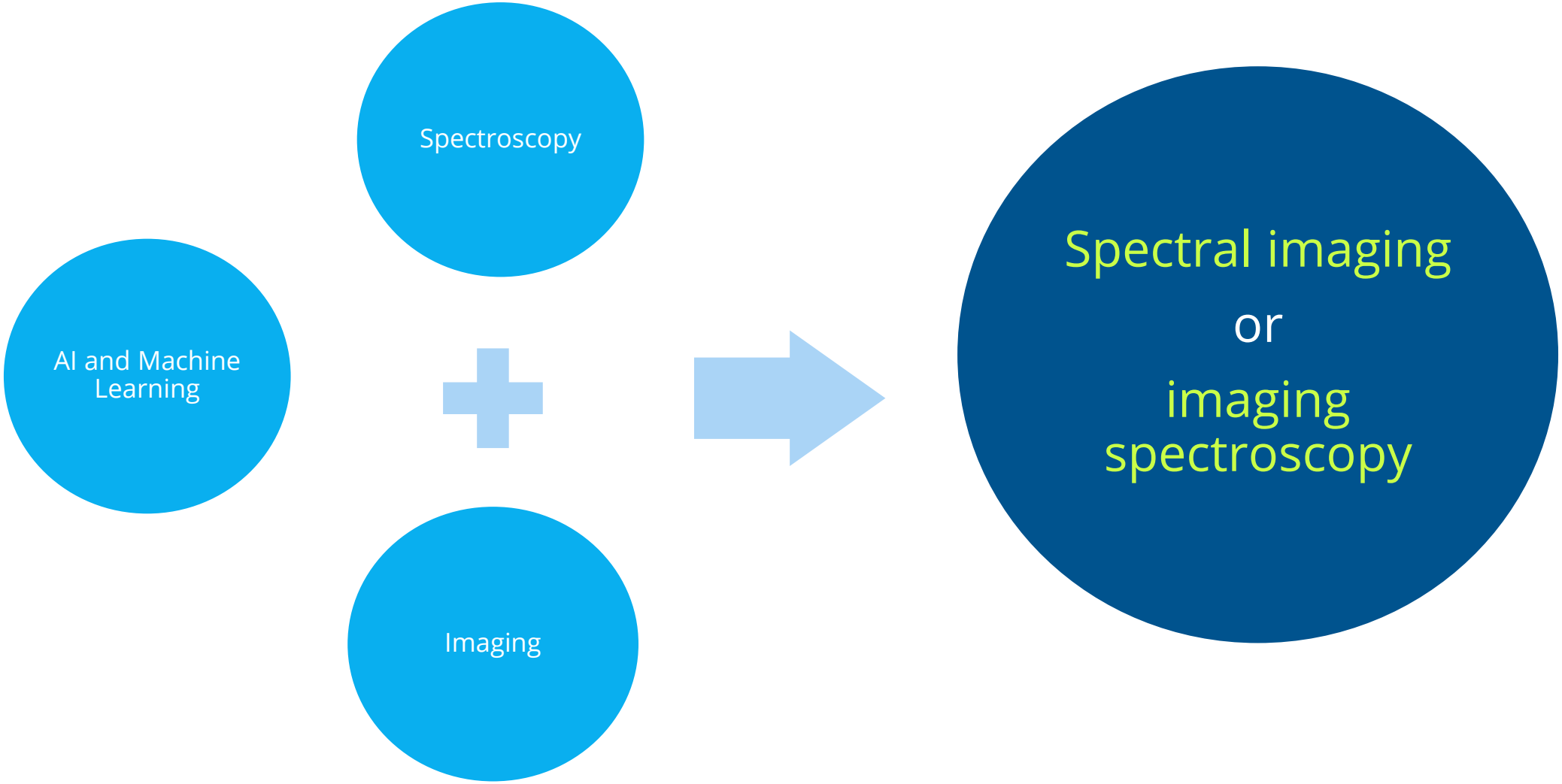
Today

Today, Videometer is a leading provider of spectral imaging solutions worldwide, selling both spectral imaging instruments and custom-made vision systems. Videometer is synonym of excellence and innovation in its field.





SPECTRAL IMAGING



WHAT COLOR IS THE CAR?

APPEARANCE

=

CHEMISTRY

X

PHYSICS

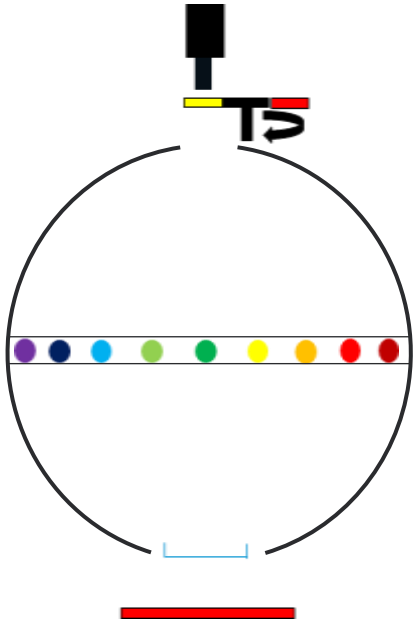
X

ENVIRONMENT

X

ILLUMINATION

LED BAND SEQUENTIAL SPECTRAL IMAGING



Camera and lens

Emission filter changer

Integrating sphere

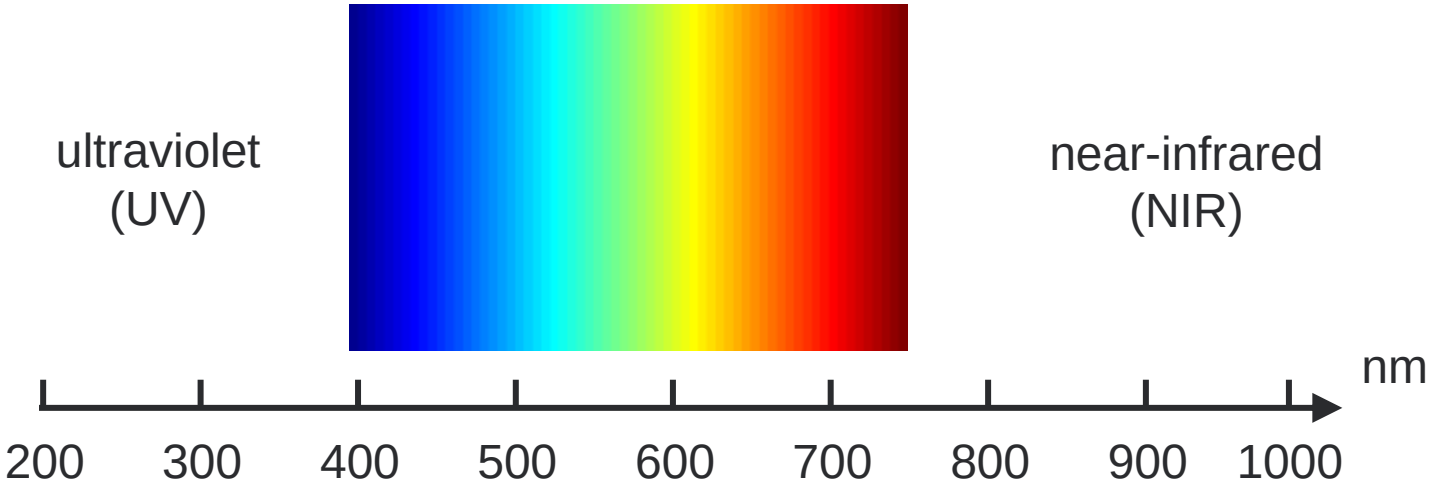
LEDs of multiple wavelengths

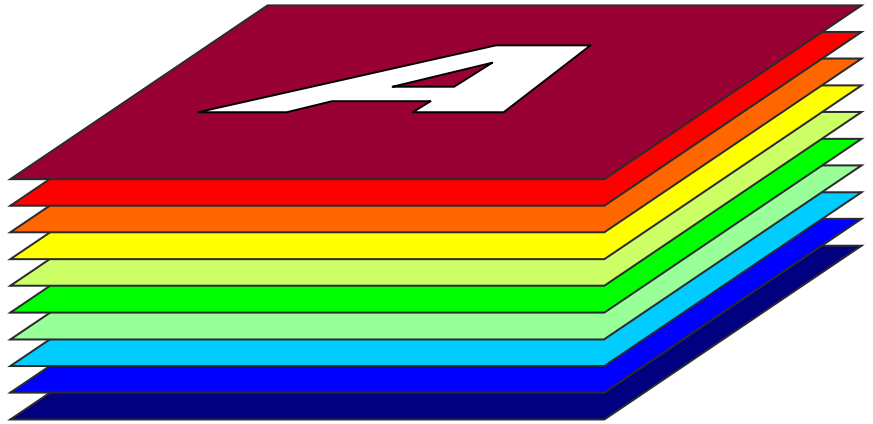
Sample is placed in target opening

Backlight or background

- LEDs: Stable, durable, large selection, rapidly developing technology
- Up to 20 different high-resolution bands acquired sequentially in 0.5-1.0 seconds
- May be combined with emission filters, backlight, and darkfield illuminant
- Combined reflectance spectral imaging and fluorescence spectral imaging possible!

SPECTRAL IMAGE

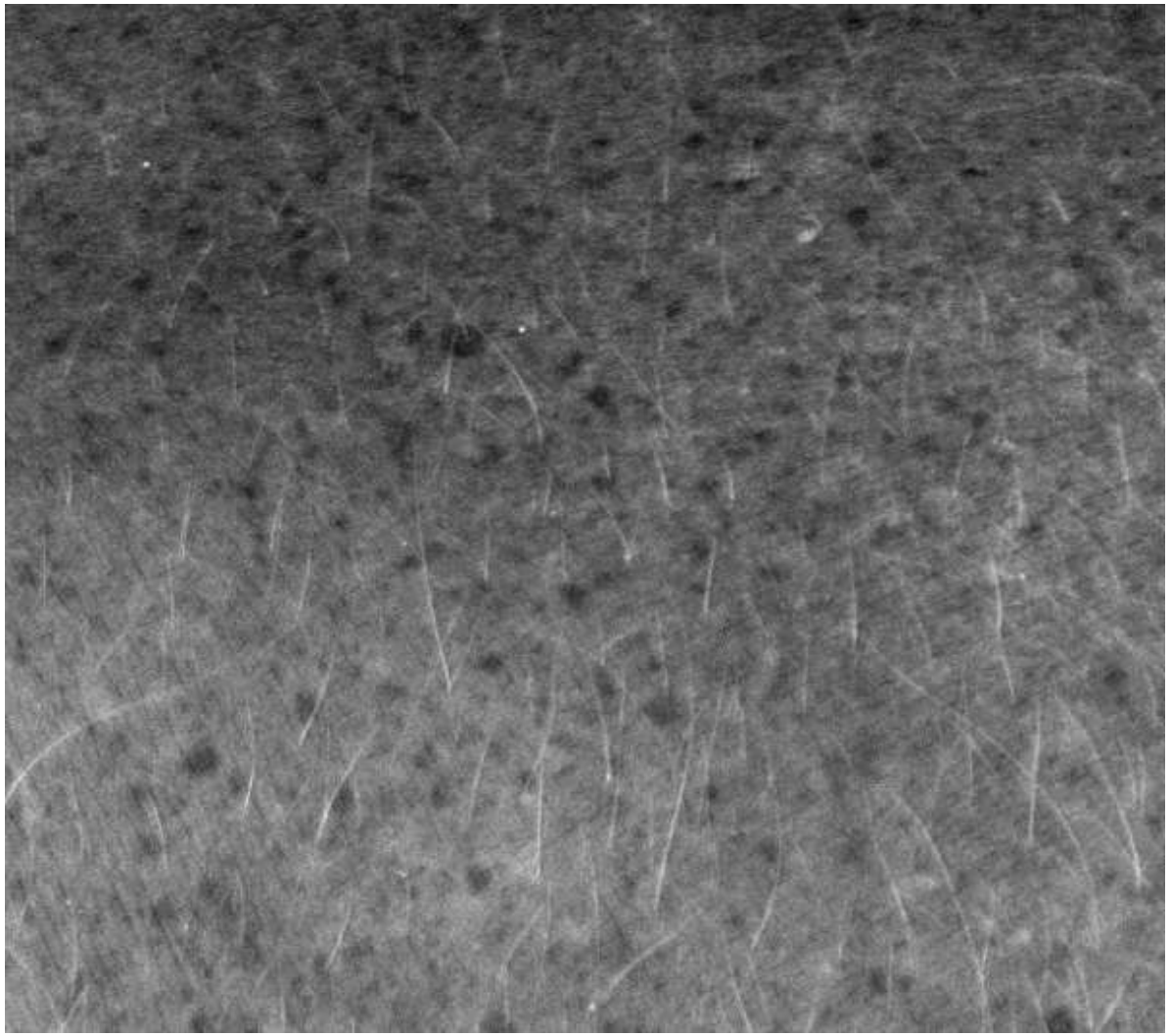




N images obtained at N wavelengths

Microbial and plant metabolites	Accurate color assessment and pigment concentration	Pigment baseline, moisture, fat, etc.	Spectral image is typically a large data structure of 100 MB to 10 GB

SKIN IMAGING



Video: 18 bands from 405 nm to 970 nm

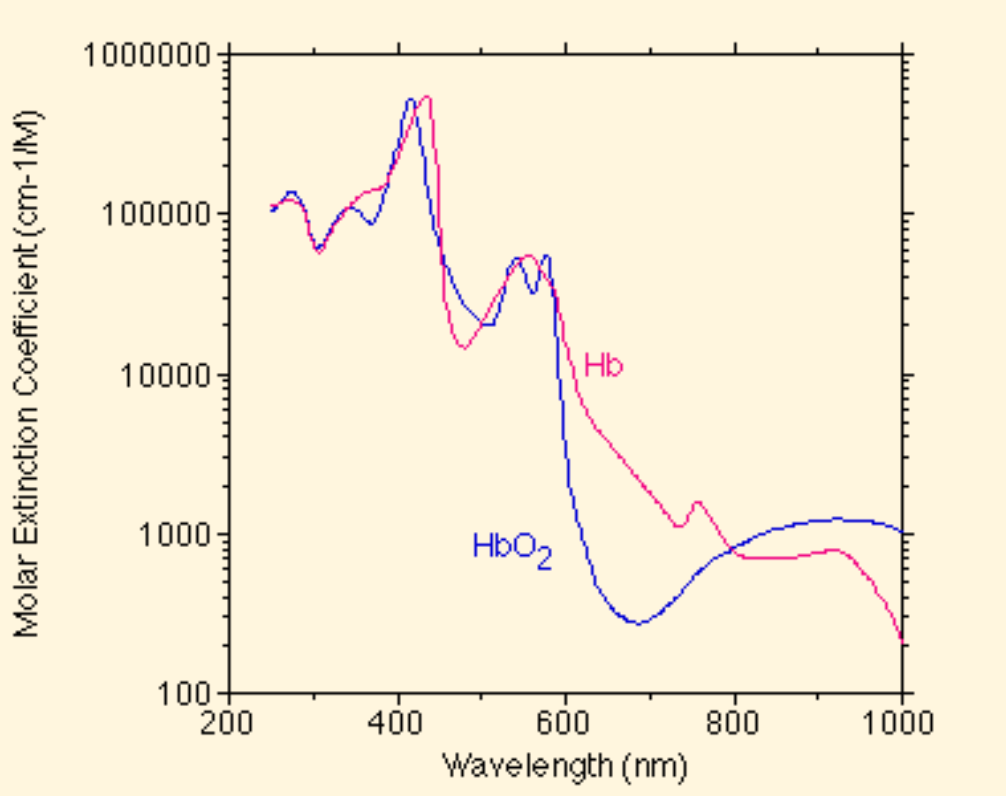
Pigmentation absorbs in UV, blue

Blood vessels absorb in NIR

Disclaimer:

Videometer instruments are not medical devices. They are not approved for clinical use including diagnosis and treatment of patients.

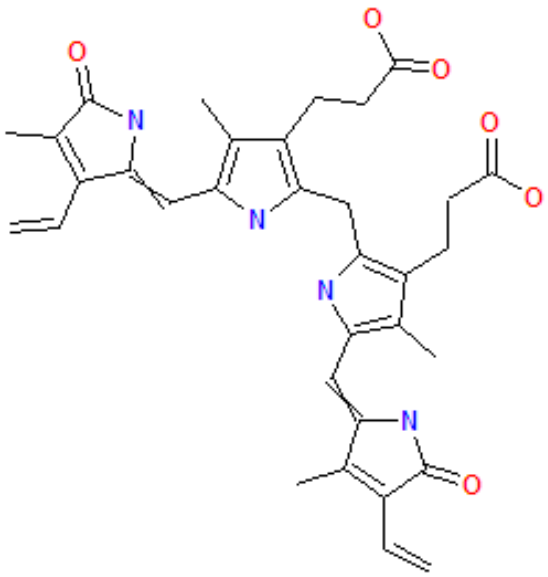
HEMOGLOBINS

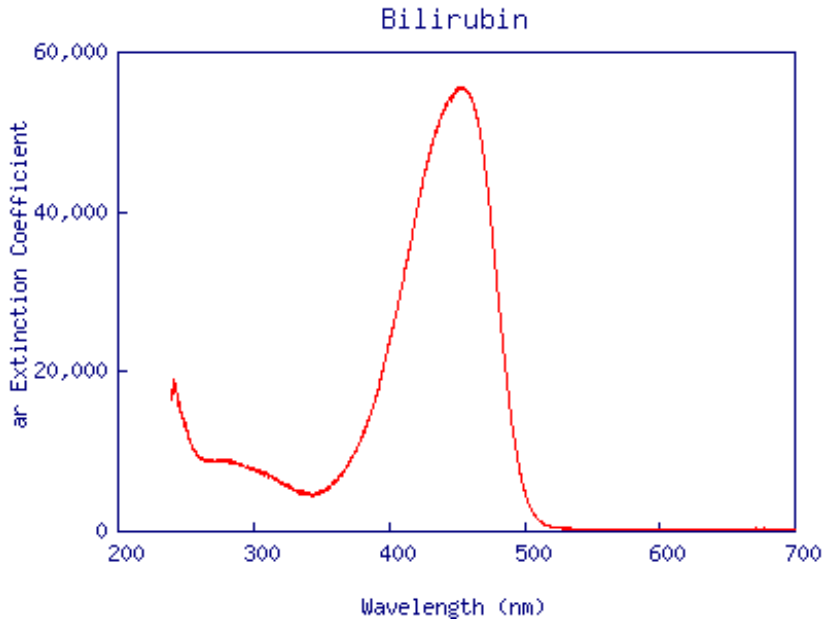


- Four globular protein subunits each contaning a heme group
- Two main states
  - Deoxyhemoglobin (red)
  - Oxyhemoglobin (blue)
- Blood pigment

BILIRUBIN

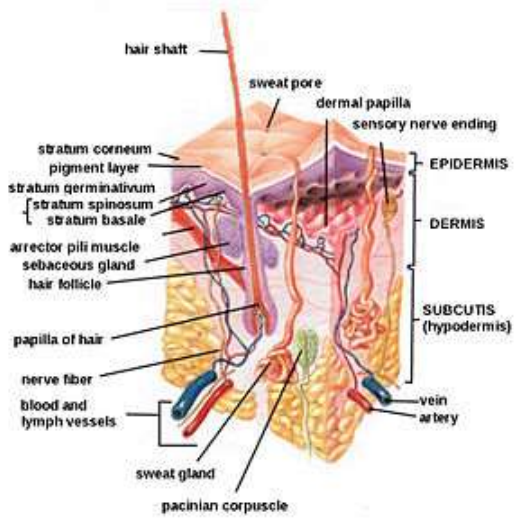
- Bilirubin is a yellow breakdown product of heme.
- Absorps light from 390 to 500 nm with peak at 453 nm.
- Jaundice is caused by increased levels of bilirubin in the human body.

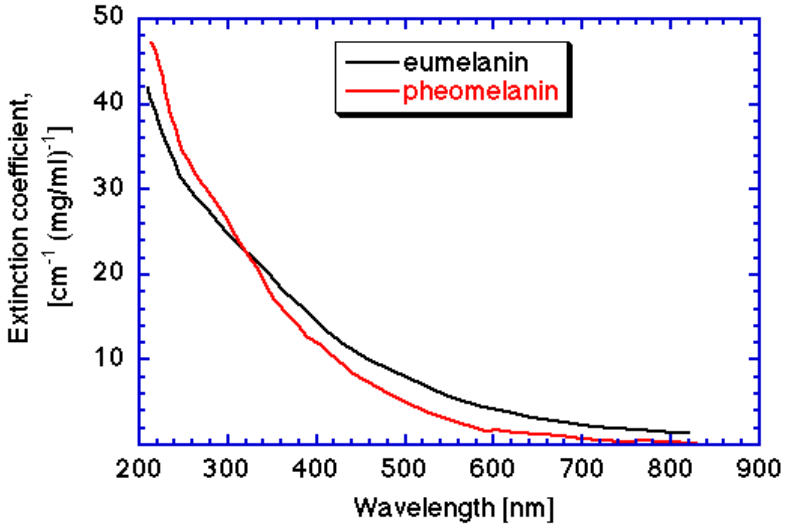




MELANINS

- Skin pigments
- Melanin is a biopolymer pigment that is responsible for the color of hair, skin and eyes.
- Dermal melanin is produced by melanocytes, which are found in the bottom layer of the epidermis.
- Two distinct classes of melanin
- Eumelanin is dark brown to black and it is the most abundant melanin in humans. Lacks the amino acid cysteine.
- Pheomelanin is red to yellow and is found in the skin of people with red or blonde hair. Contains cysteine.

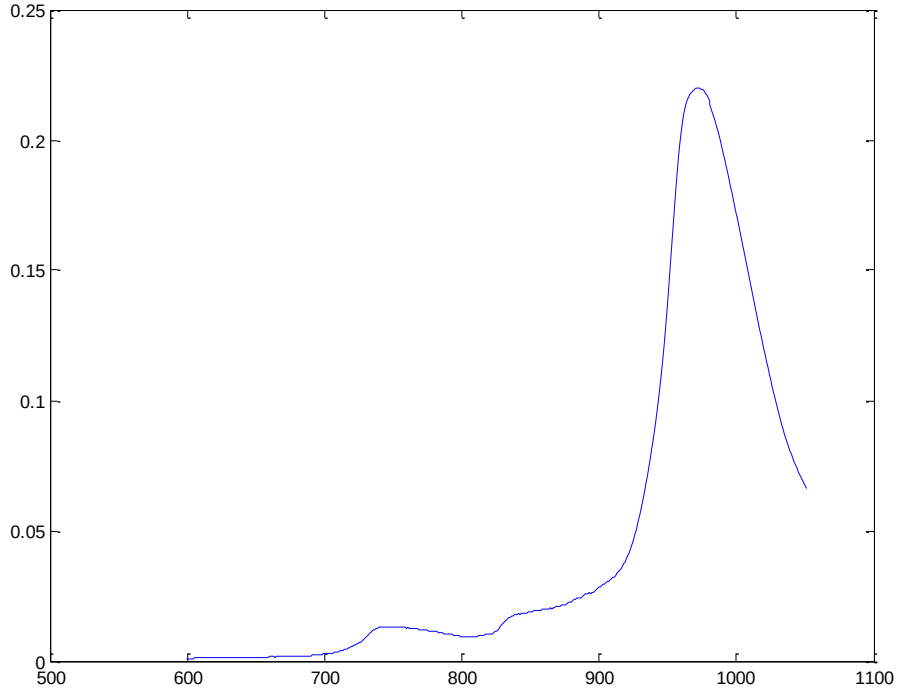




T Sarna, HM Swartz, The physical melanins, in "The Pigmentary System", ed. JJ Nordlund et al., Oxford University Press, 1988

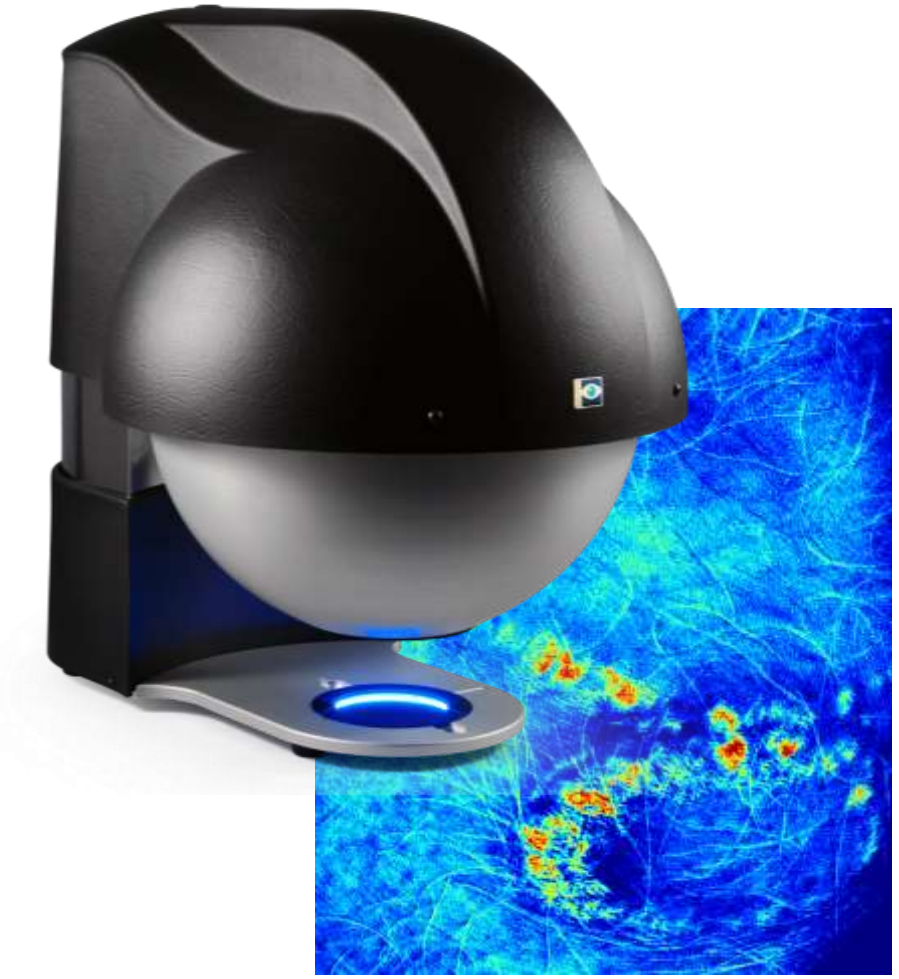
WATER/MOISTURE DETECTION

- Absorption max at 970-980 nm
- Moisture also reduces scattering and – like oil - makes skin more translucent
- Stronger water/moisture absorption peak at 1450 nm is outside the range of silicon cameras. More expensive cameras based on InGaAs or MCT sensors needs to be used.



ABUNDANCE INDICES FOR SKIN

- Melanin index
  - Eumelanin
  - Pheomelanin
- Hemoglobin index
  - Oxy-hemoglobin
  - Hemoglobin
- Bilirubin index
- Hemosiderin index
- Moisture index
- Fluorescence index
  - Collagen
  - Melanin



VIDEOMETERLAB AGILE

- 18-20 spectral bands from 365 nm to 970 nm
- 12 Mpix per band, pixel size app. 30 µm x 30 µm
- Field-of-view up to 110 mm diameter
- Acquisition time 1-2 seconds

APPLICATION EXAMPLES

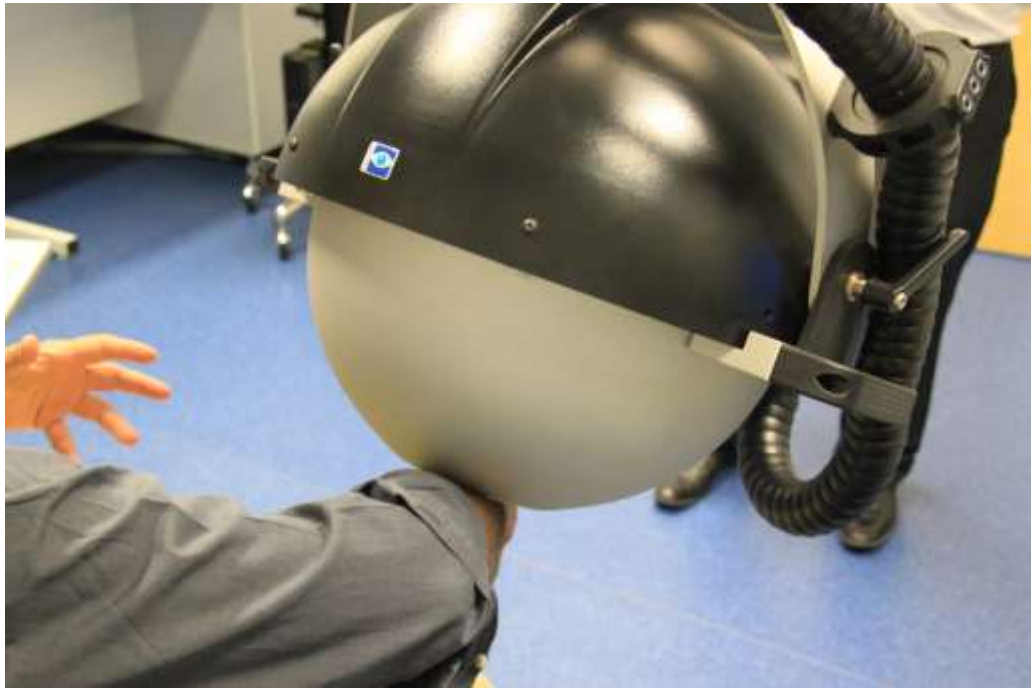
Hair

- Color and color homogeneity
- Treatment effect /efficacy of treatment
- Durability of treatment

Skin

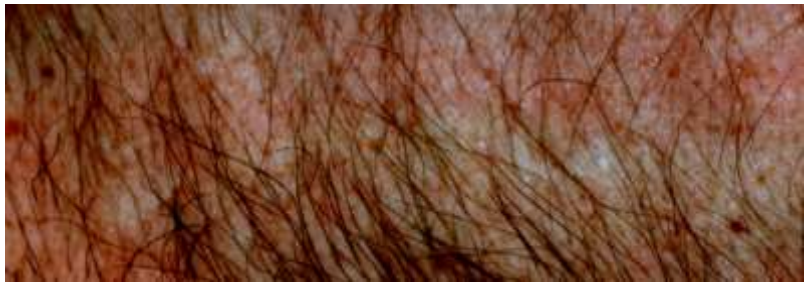
- Color
- Pigmentation disorders
- Redness, inflammation, scaling
- Treatment effect /efficacy of treatment
- Durability of treatment

FACE AND ARM MEASUREMENTS



SEPARATING HUMAN HAIR AND SKIN

NIR wavelengths can be used for separating hair and skin



Skin + Hair

Hair

Useful in studies of skin pigmentation, e.g. in dermatological research and assessment of treatment efficacy

Skin

Virtual shave: Hair replaced with average skin color

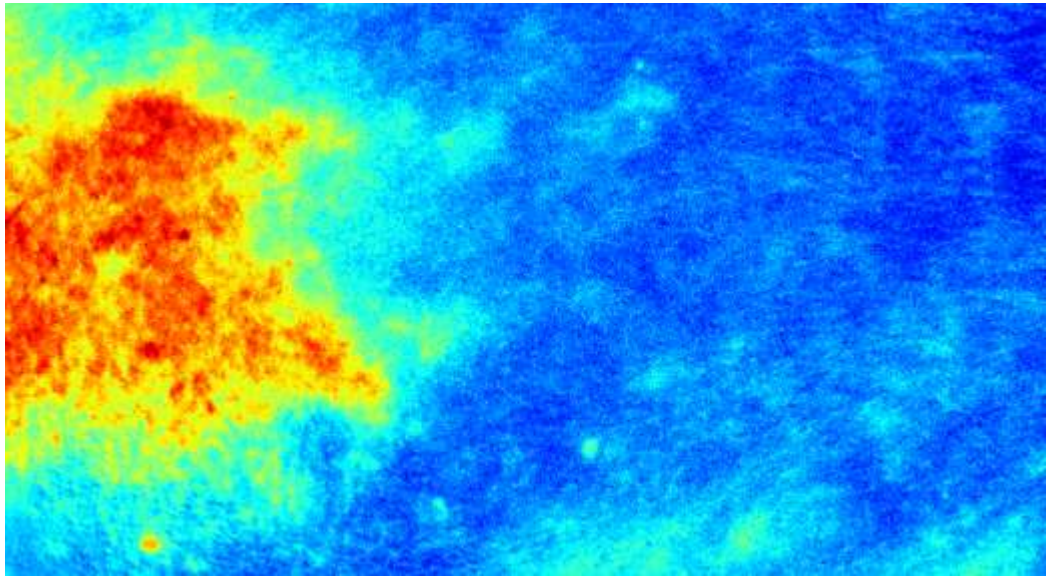
PSORIASIS AND ECZEMA SCORING

- Redness
- Scaling

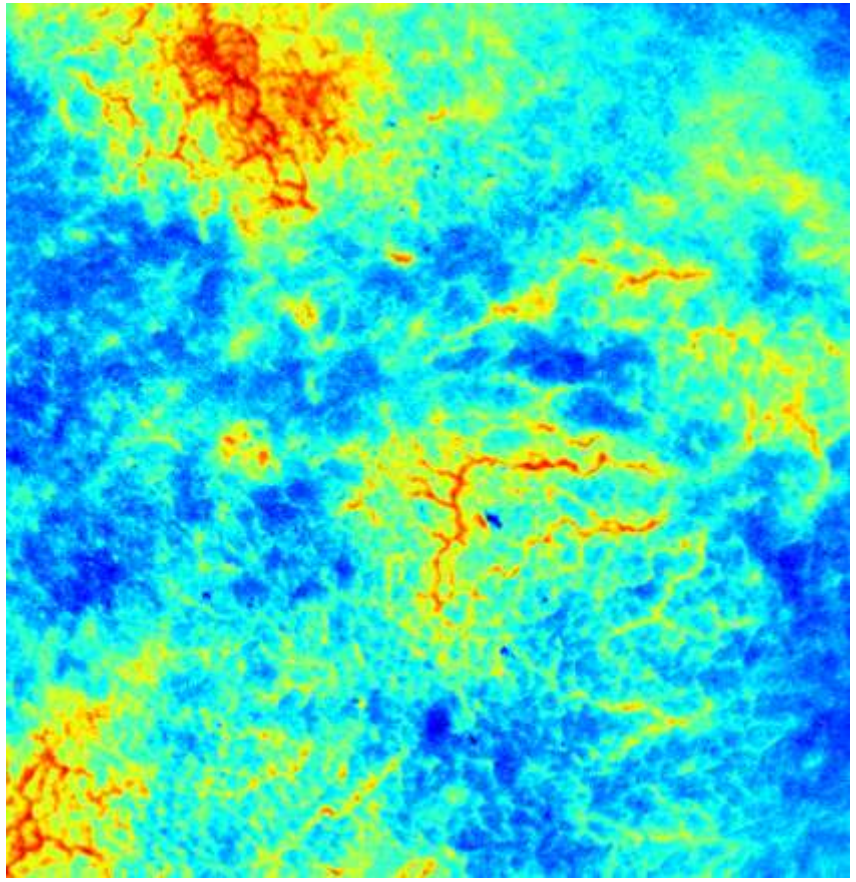
References

Gomez, Ersbøll, Carstensen, search
http://scholar.google.dk/
or direct link here
Hand eczema

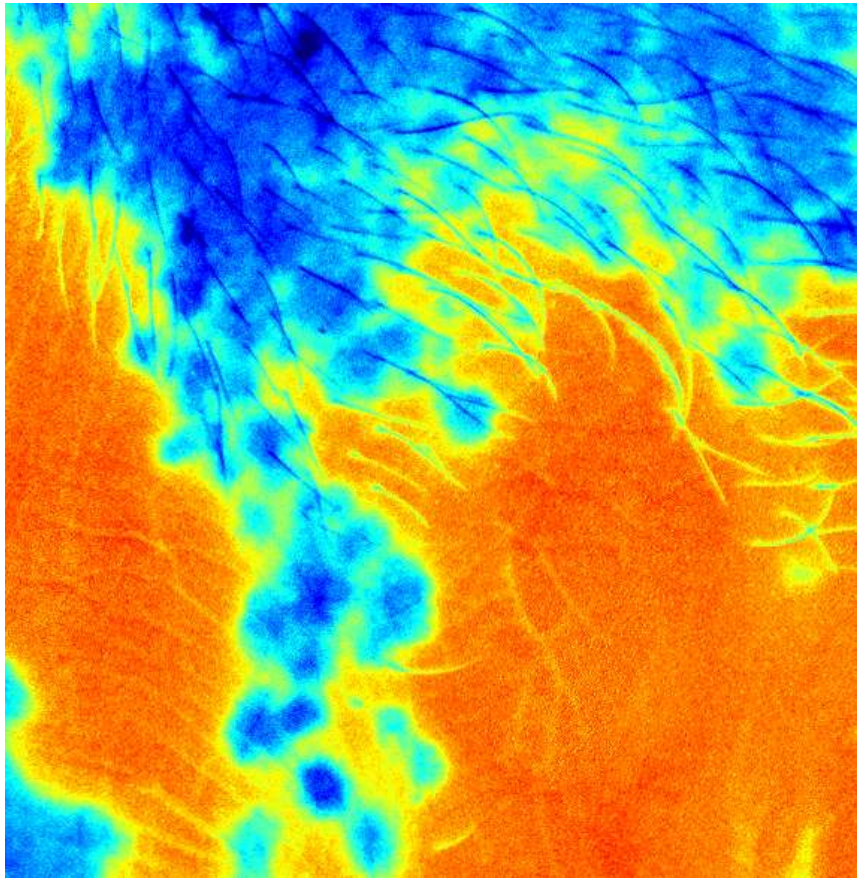
MELASMA DETECTOR



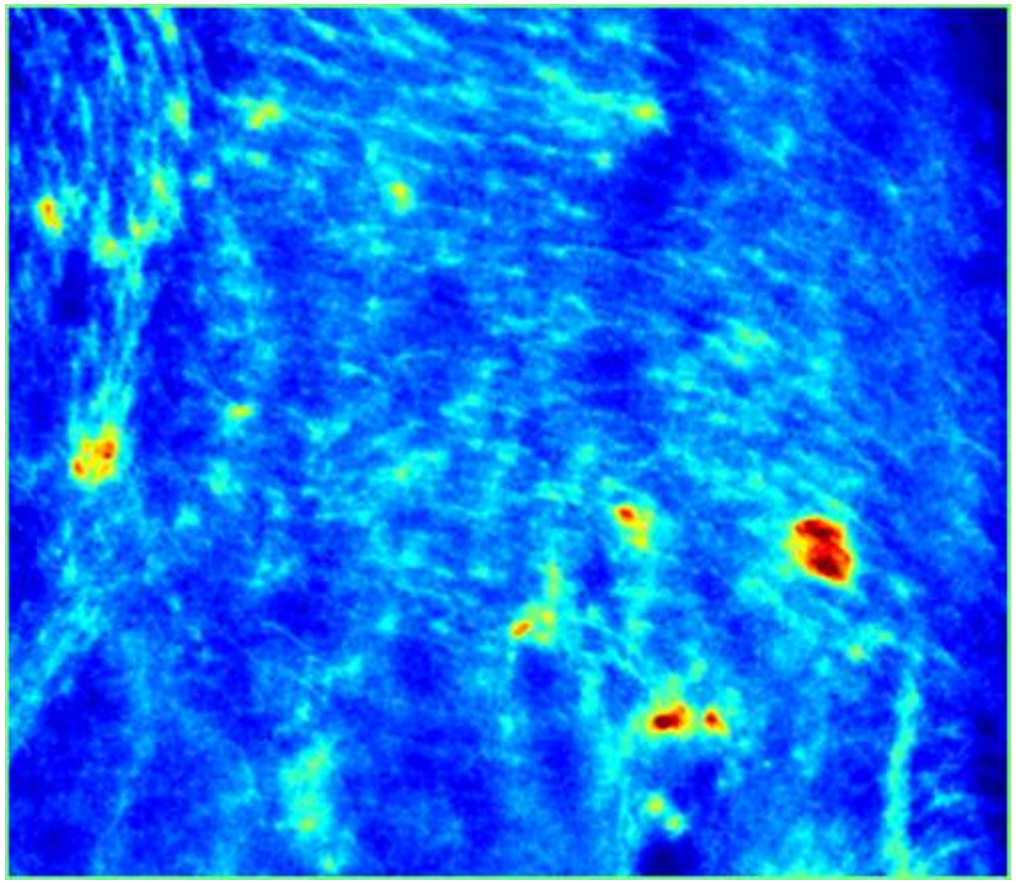
ROSACEA DETECTOR

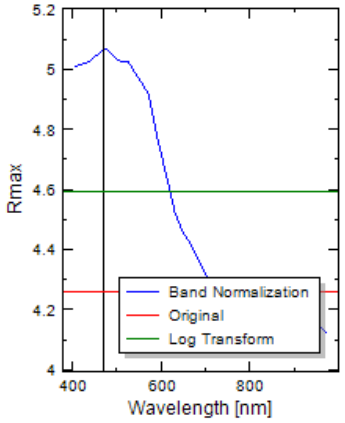


VITILIGO DETECTOR

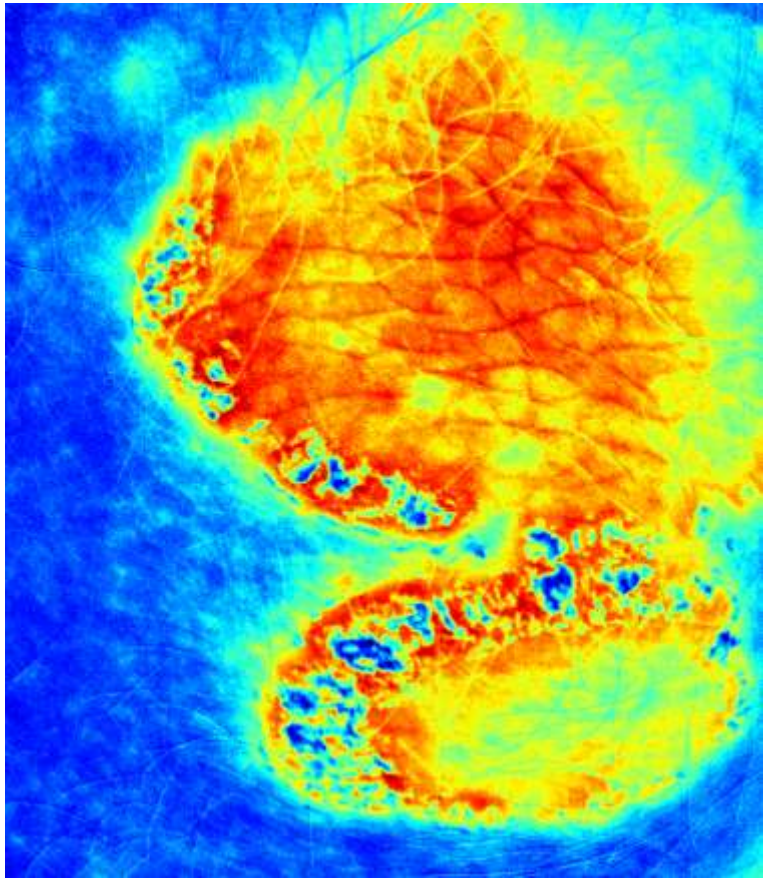


SOLAR FRECKLE DETECTOR

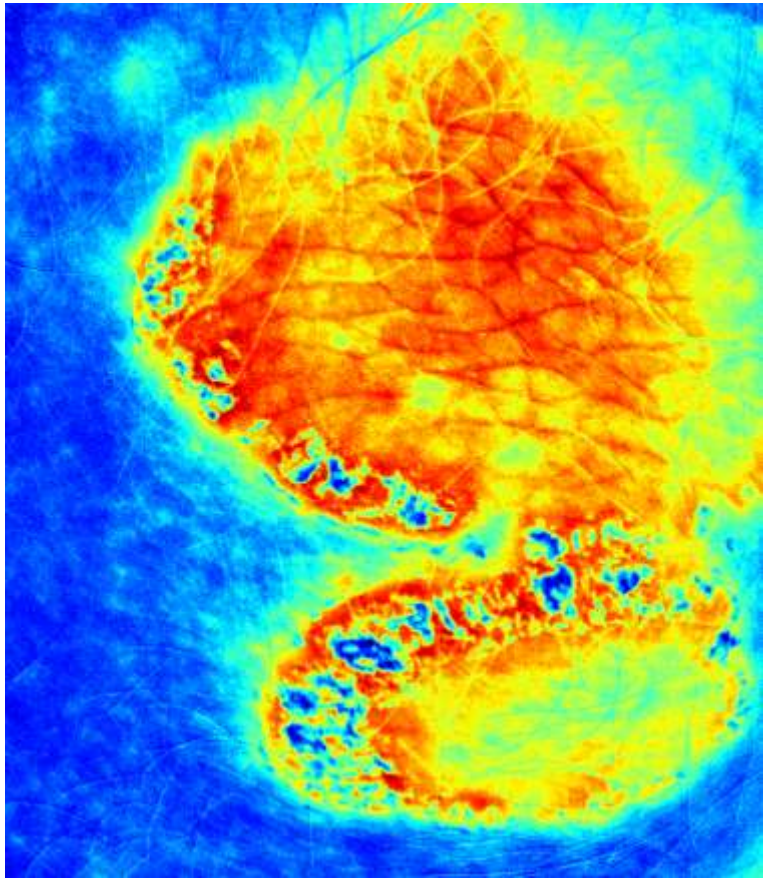




PSORIASIS REDNESS SCORING

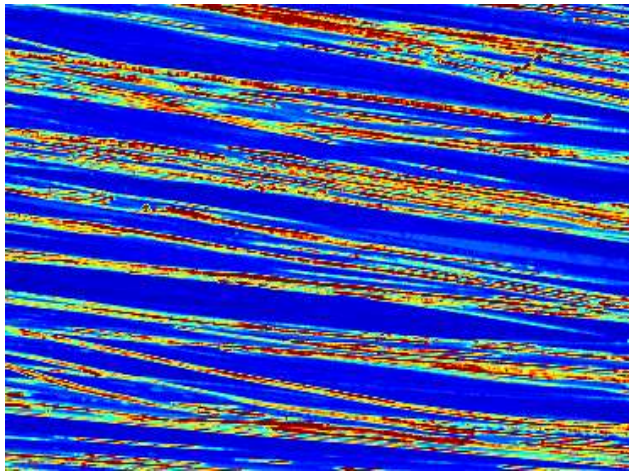


PSORIASIS SCALING SCORING

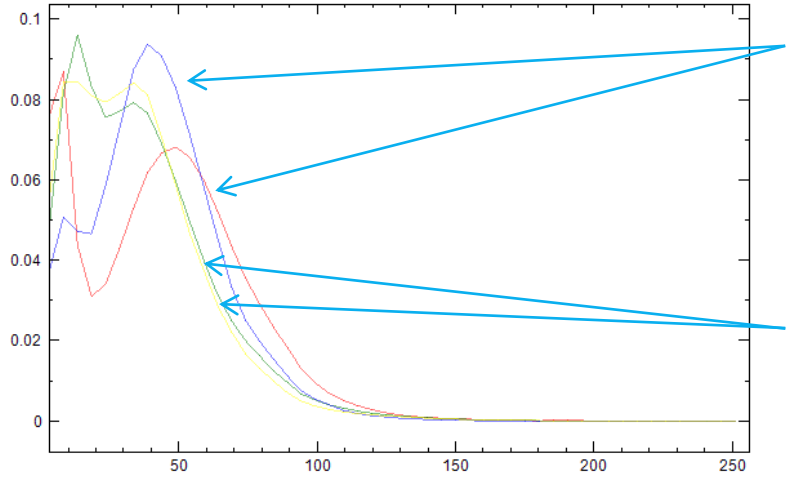


HAIR GLOSS MEASURED WITH VIDEOMETER MULTIRAY

Multiray gloss image



Gloss histogram

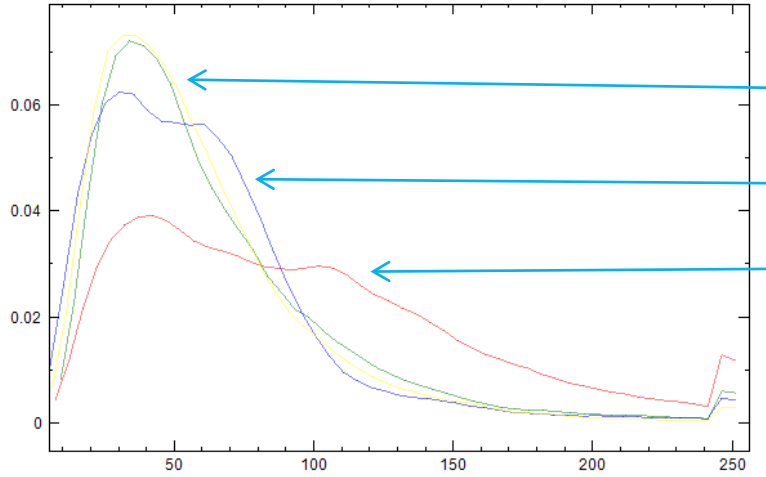


Red and blue curves are treated hair

Green and yellow curves are untreated hair

Example of hair ridge segmentation

Gloss histogram



Untreated (Yellow and green)

1 treatment (Blue)

3 treatments (Red)

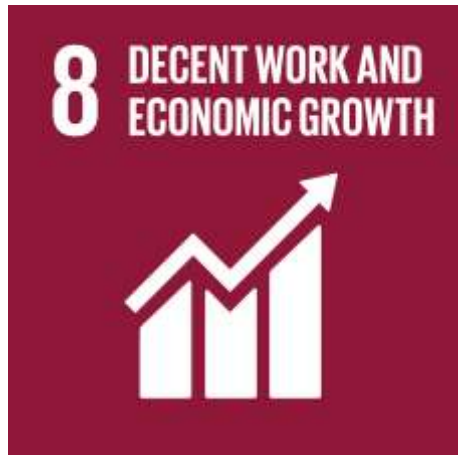
VIDEOMETERLITE

- 7 strobes with wavelengths 405 – 850 nm
- Integrating sphere for homogeneous and diffuse light distribution
- 65 m/pixel resolution
- 1520 x 1520 pixels per wavelength image resolution
- Superior color determination
- Up to 100.000 hours lifetime of the light sources

OUR VALUES

Zero Hunger and
Food Security

Good Health and
Well-Being



Decent Work and
Economic Growth

Responsible Consumption
and Production

Life Below Water

Partnership for
the Goals

THANK YOU!

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