

VideometerLab for skin analysis

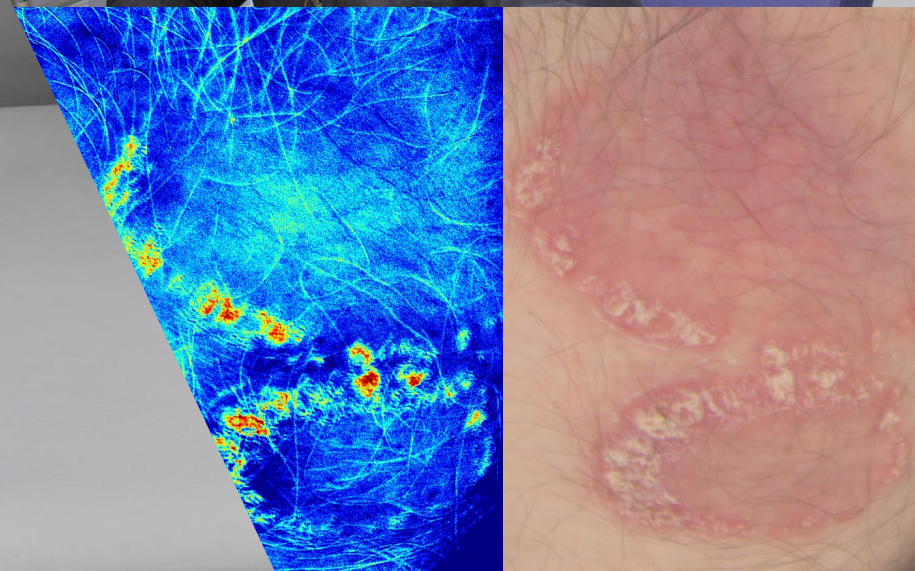
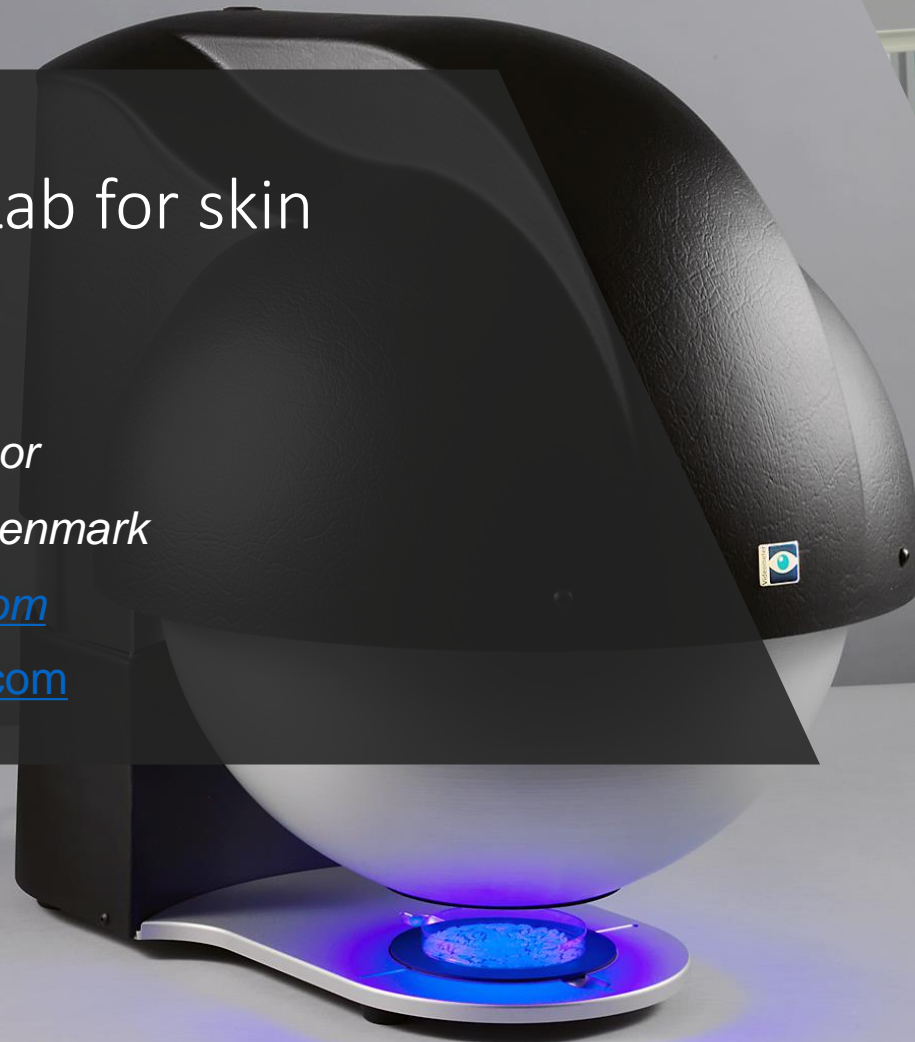
Videometer A/S

Horkaer 12B, 3. floor

DK-2730 Herlev, Denmark

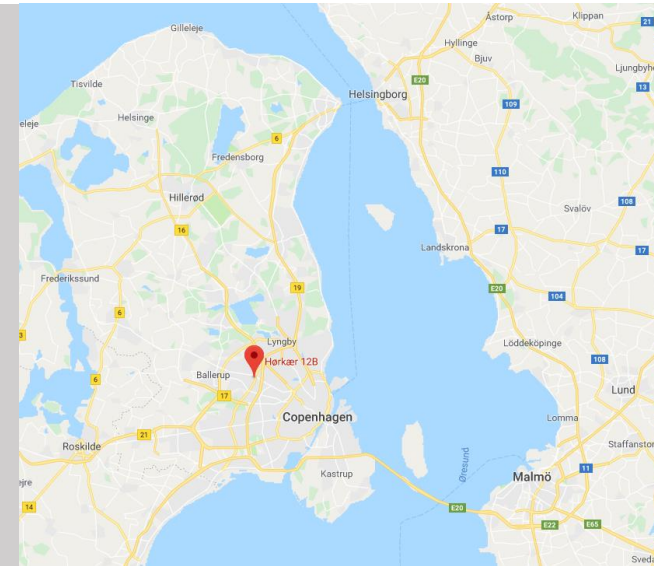
www.videometer.com

mail@videometer.com

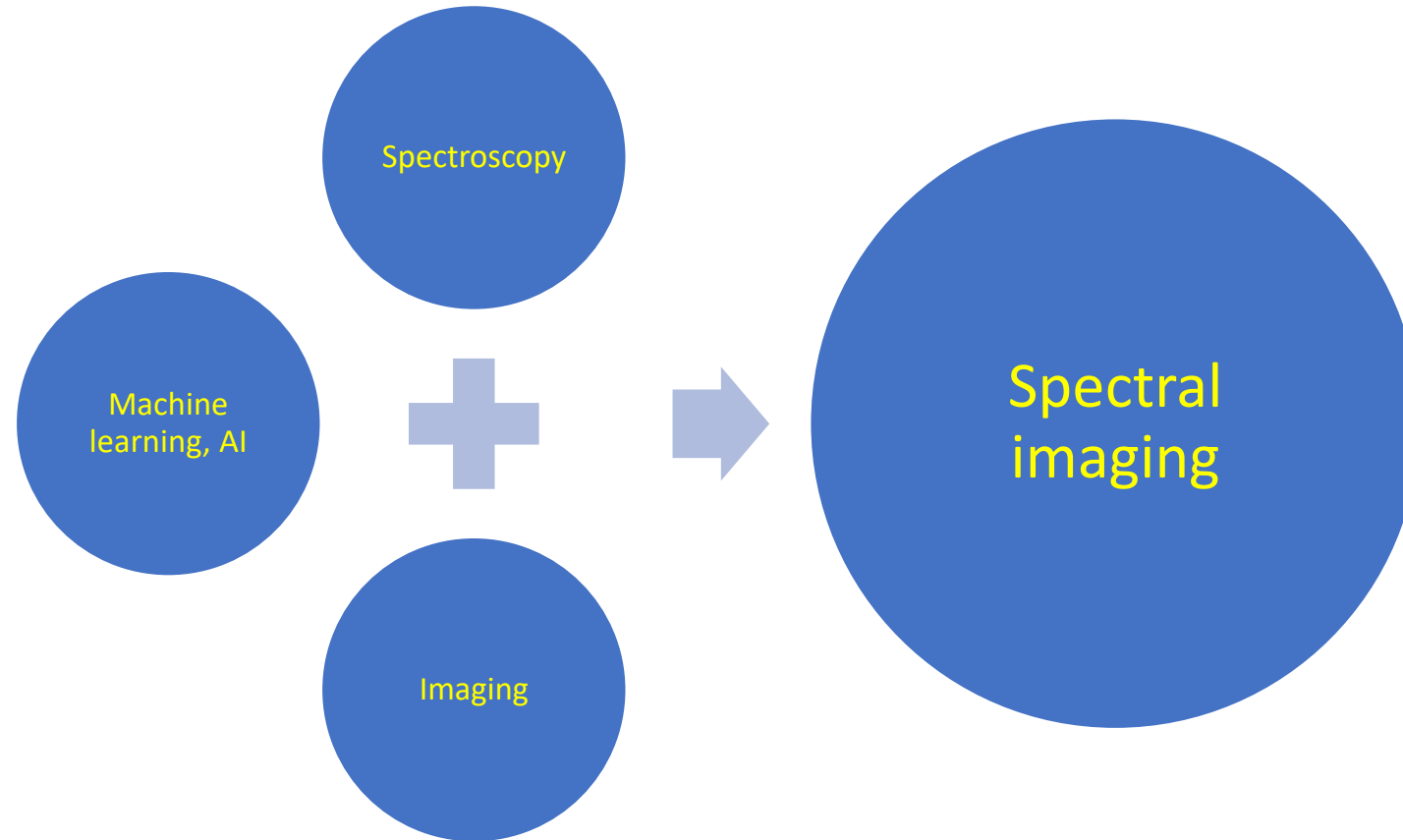


Videometer A/S

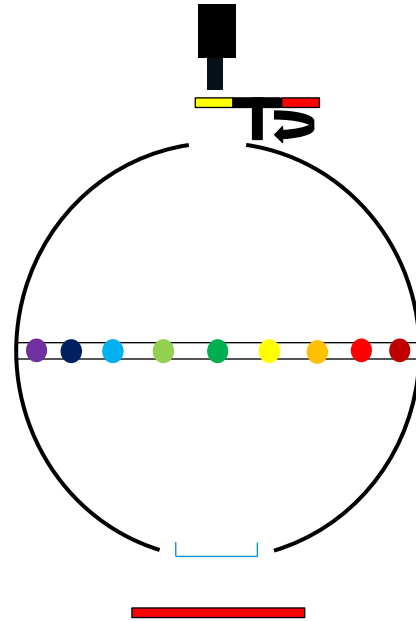
- Spectral imaging company
- Founded 1999
- Products
 - Lab instruments,
 - Turn-key in-line systems, and
 - R&D projects
- App. 700 imaging R&D projects since 2000
- In-line 24/7 spectral imaging since 2002
- Based in Copenhagen, Denmark
- Partnerships worldwide



Spectral imaging



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!

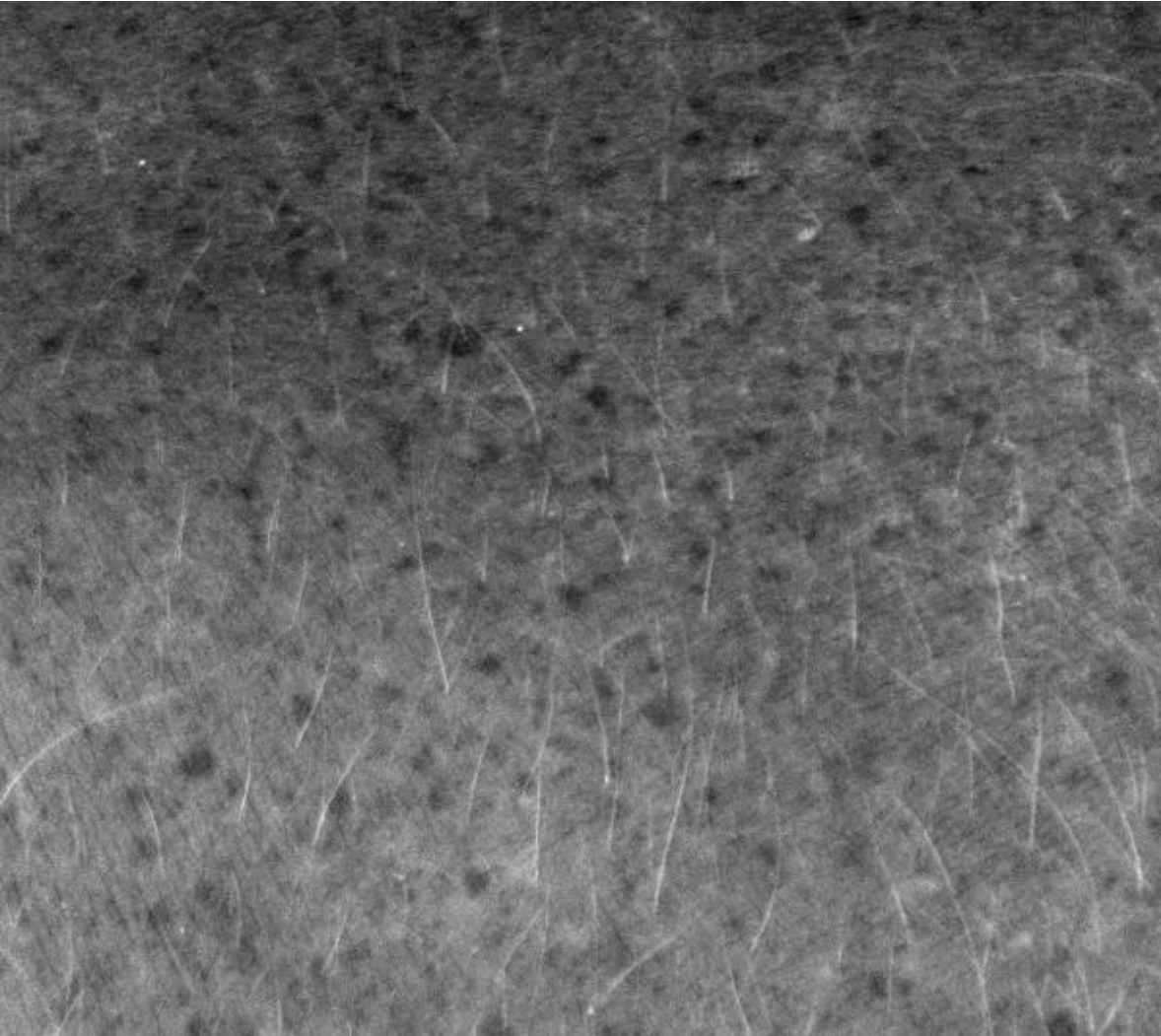
VideometerLab 4

Flexible lab and at-line instrument for spectral imaging



- 19-20 spectral bands in the range 365-970 nm
- 4096x3000 pixels, 30 μm pixelsize, FOV 123x90 mm
- Very homogeneous and diffuse illumination
- Strobed multi-LED light source
- 10 seconds per sample including handling
- Optional backlight strobe
- Optional fluorescence bands
- Software for calibration, acquisition, and analysis
- Patented technology

Skin imaging



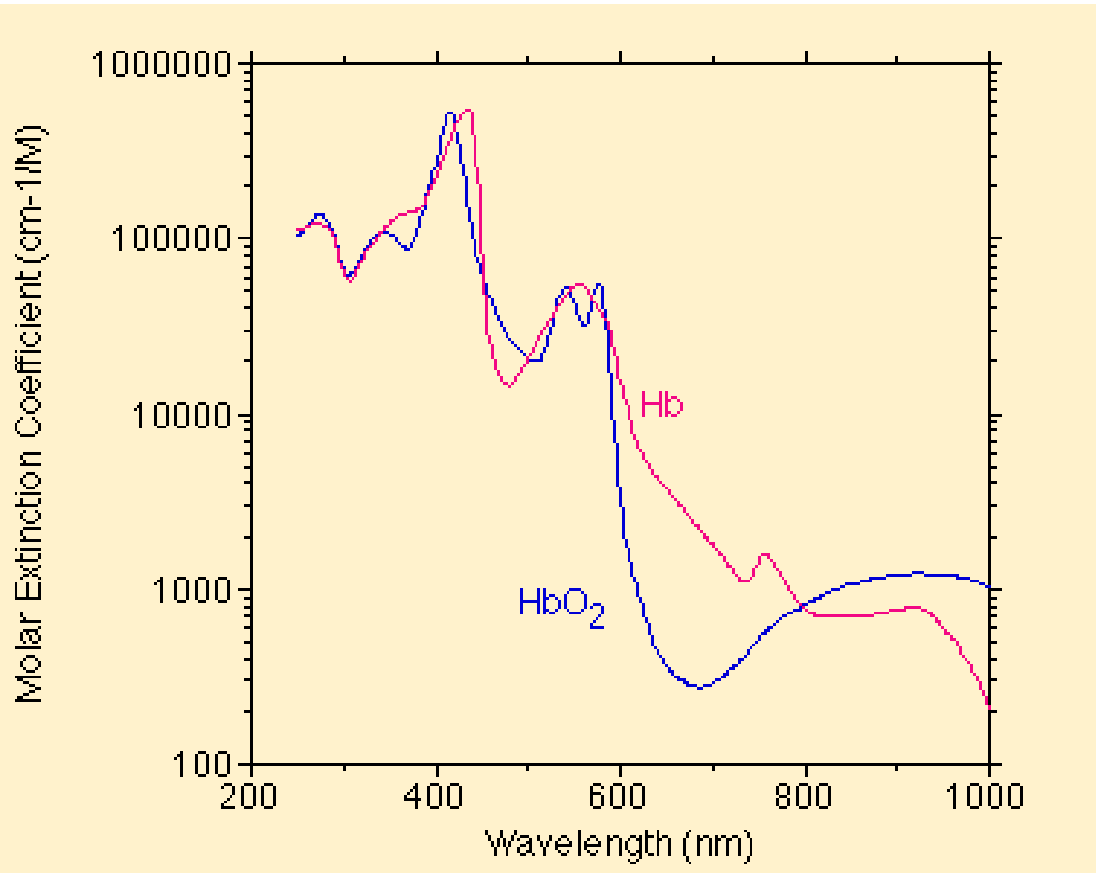
Video: 18 bands from 405 nm to 970 nm

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.

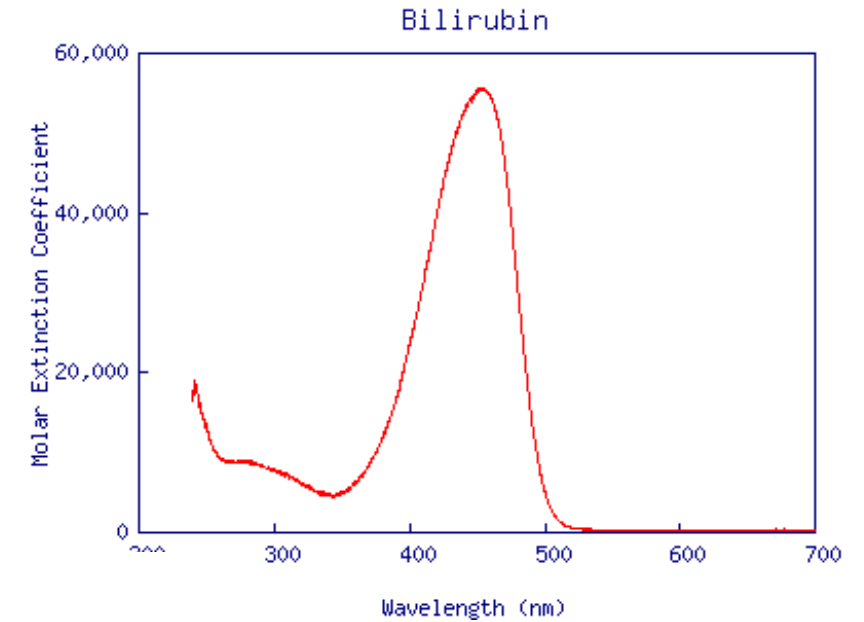
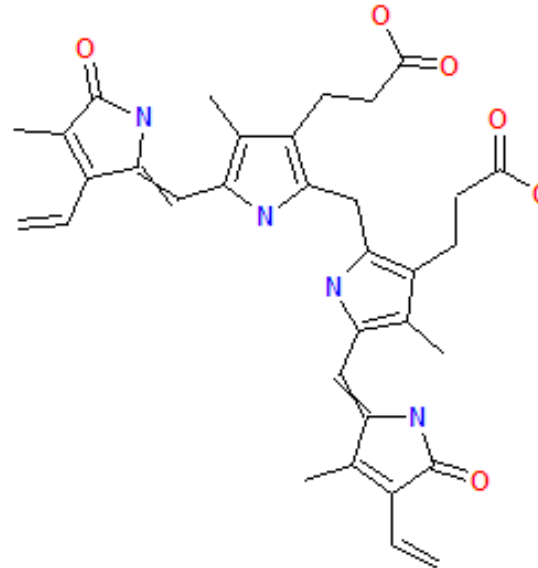
Hemoglobins



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

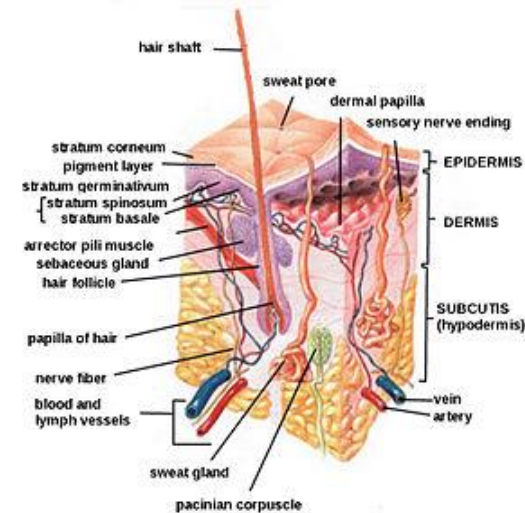
Bilirubin

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

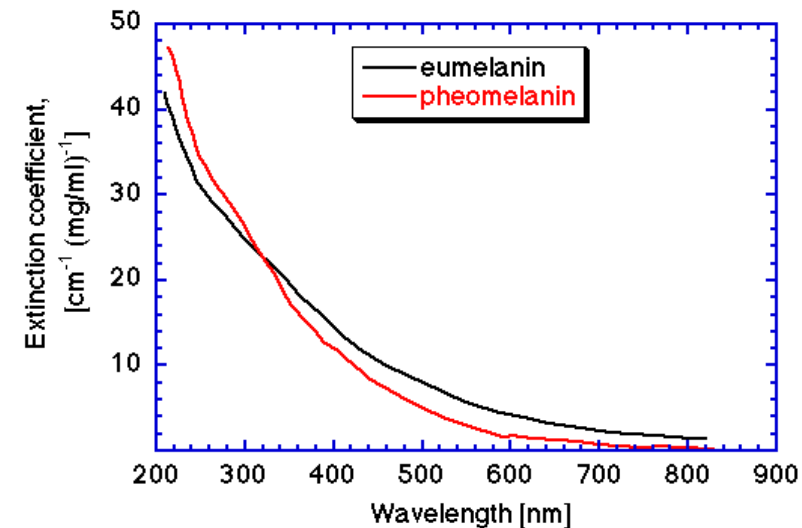


Melanins

- 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.



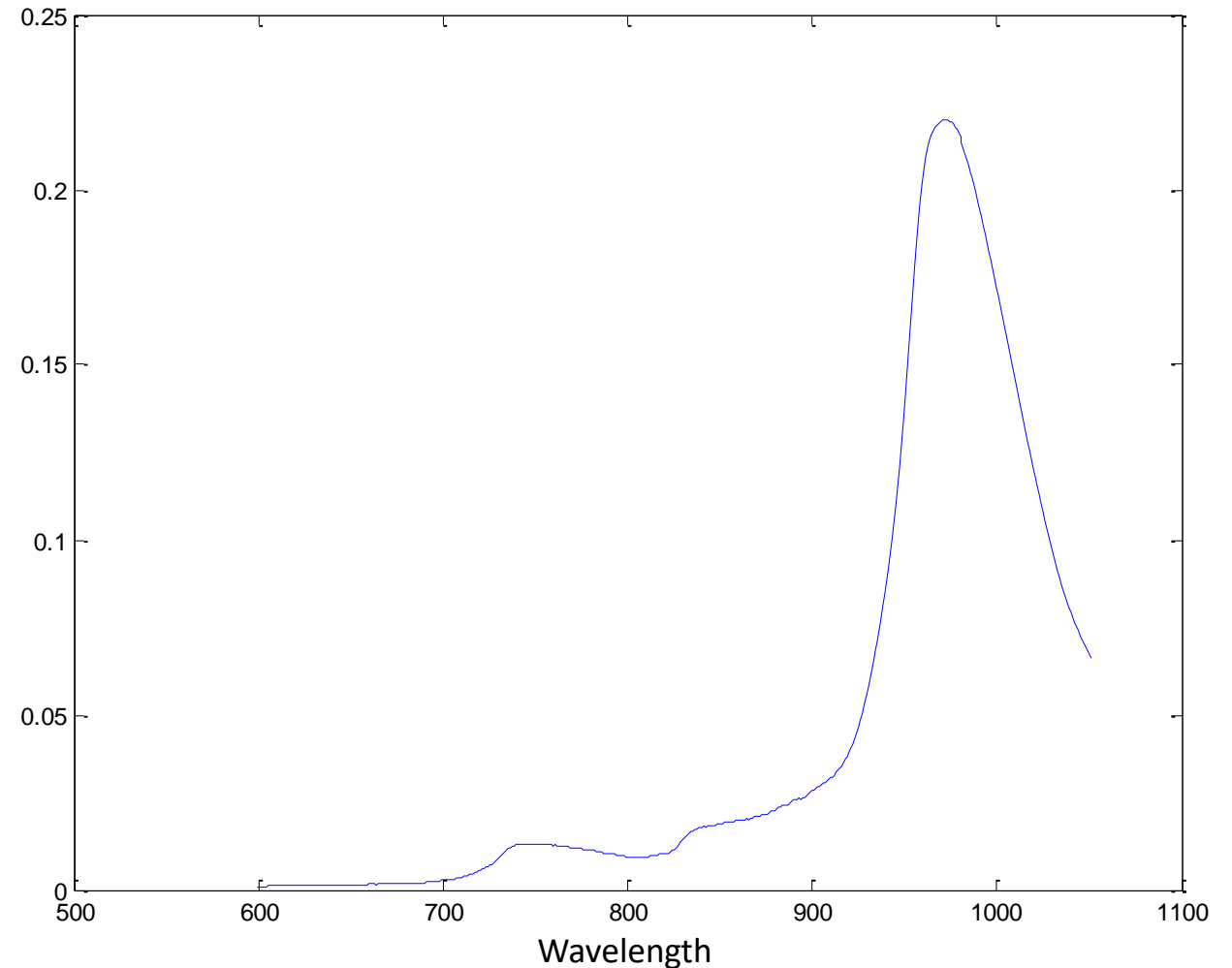
Source: <http://en.wikipedia.org/wiki/Skin>



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.

Absorption



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

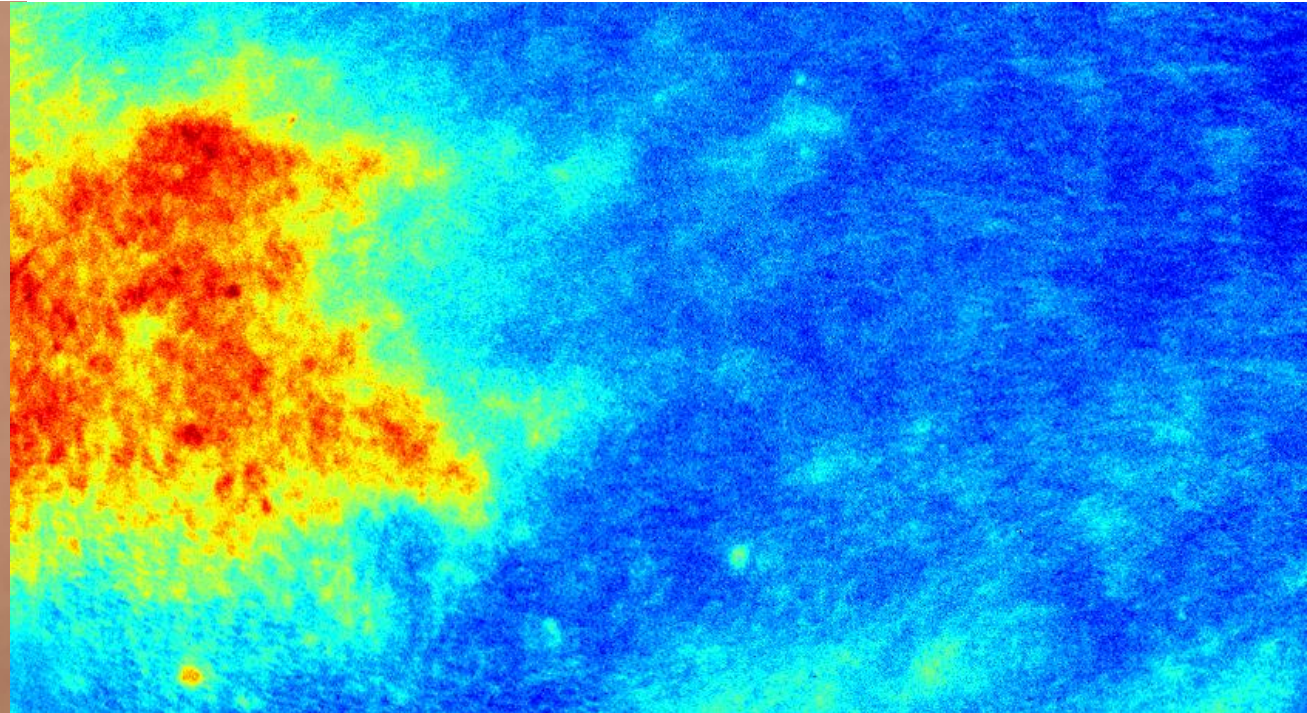
Virtual shave: Hair replaced with average skin color

Psoriasis and eczema scoring

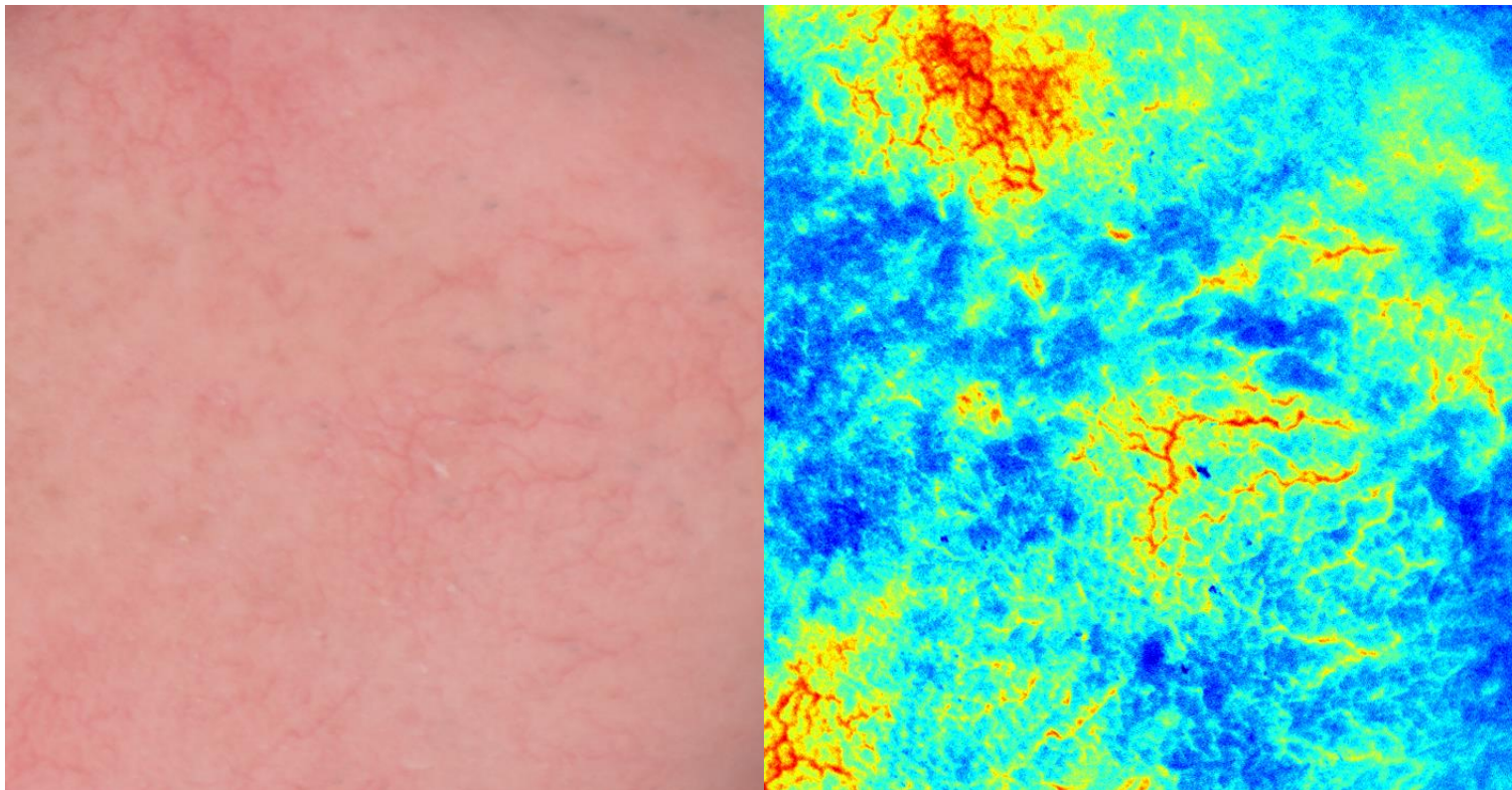
- Redness
- Scaling
- References
 - Gomez, Ersbøll, Carstensen, search <http://scholar.google.dk/>
 - or direct link [here](#)
 - [Hand eczema](#)



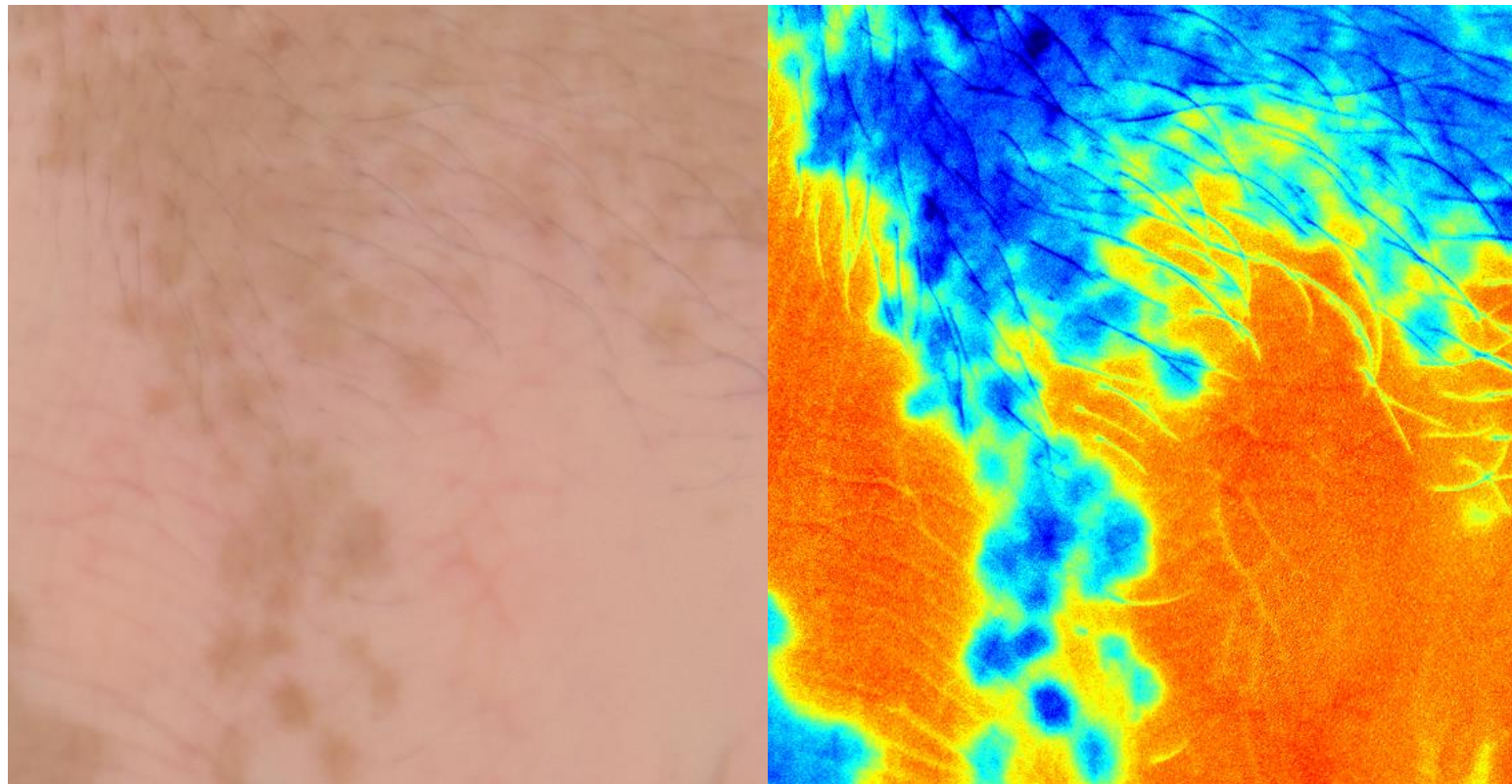
Melasma detector



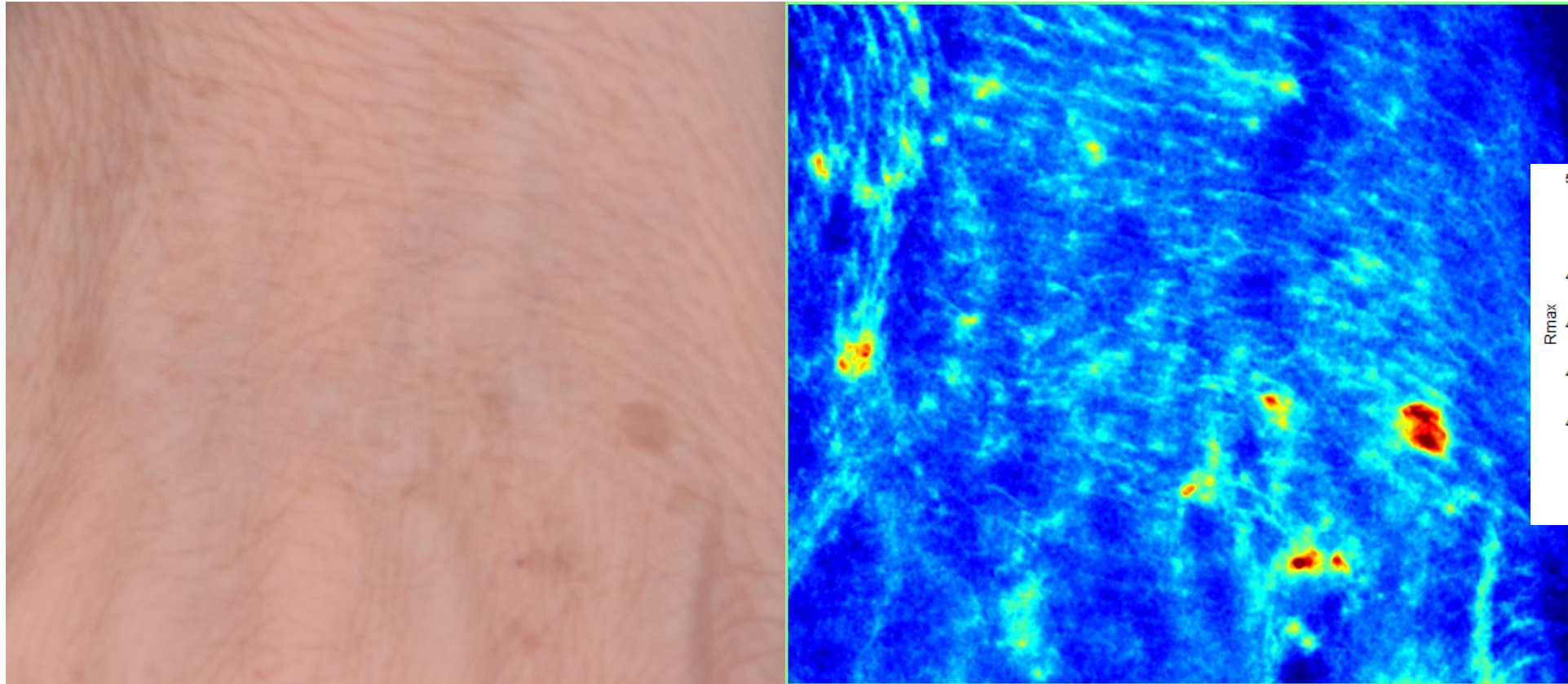
Rosacea detector



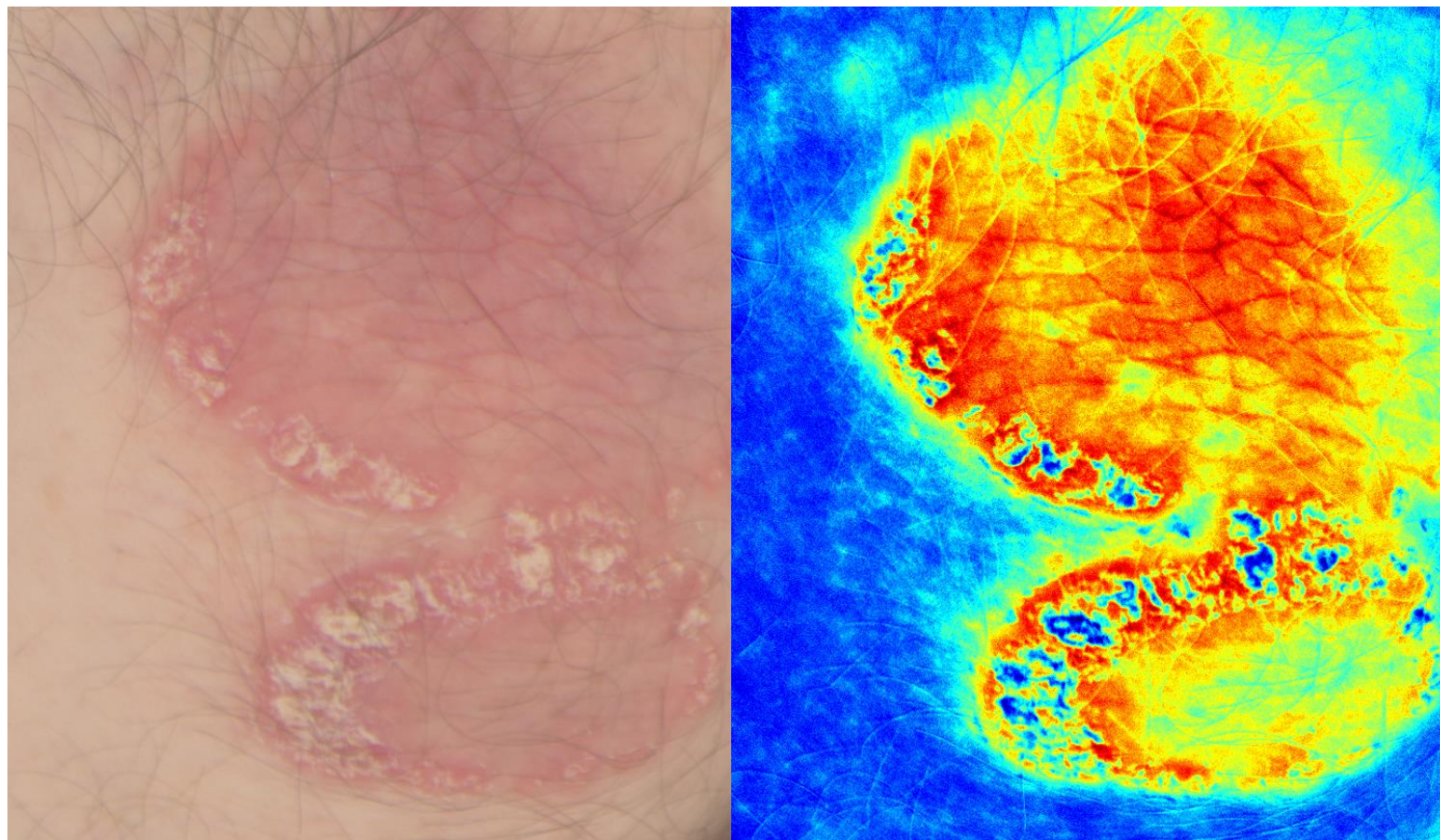
Vitiligo detector



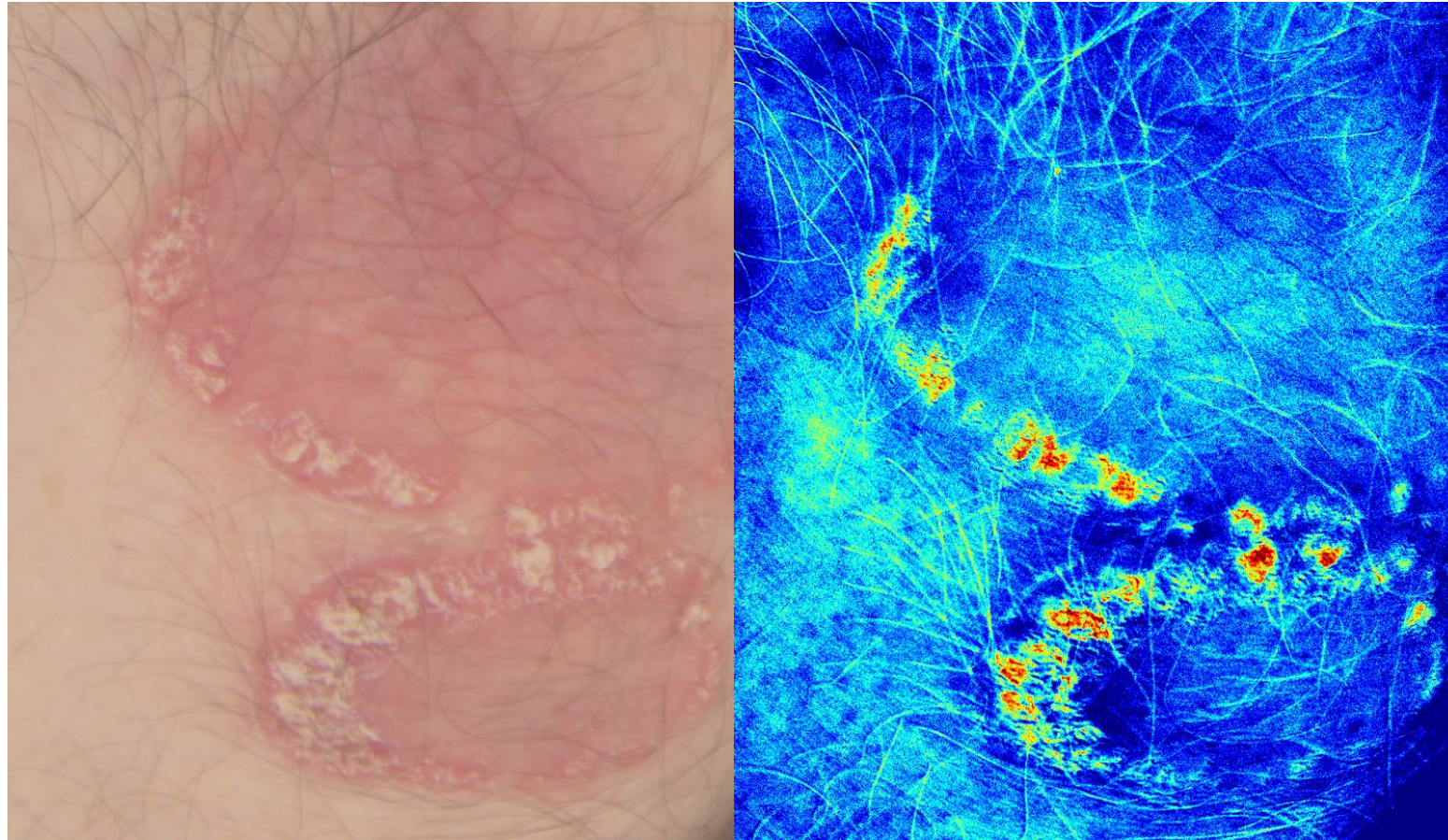
Solar freckle detector



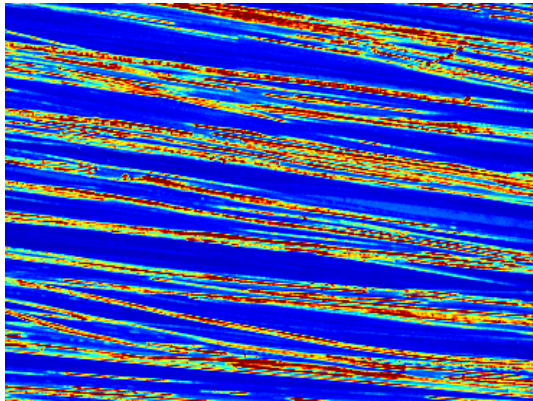
Psoriasis redness scoring



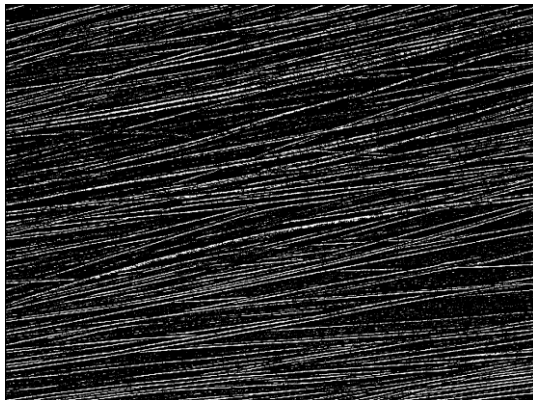
Psoriasis scaling score



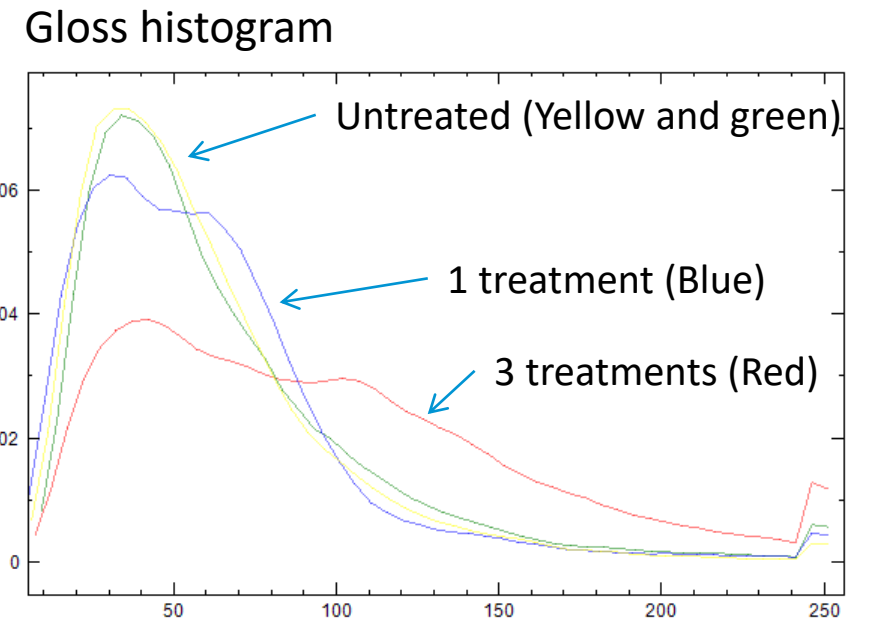
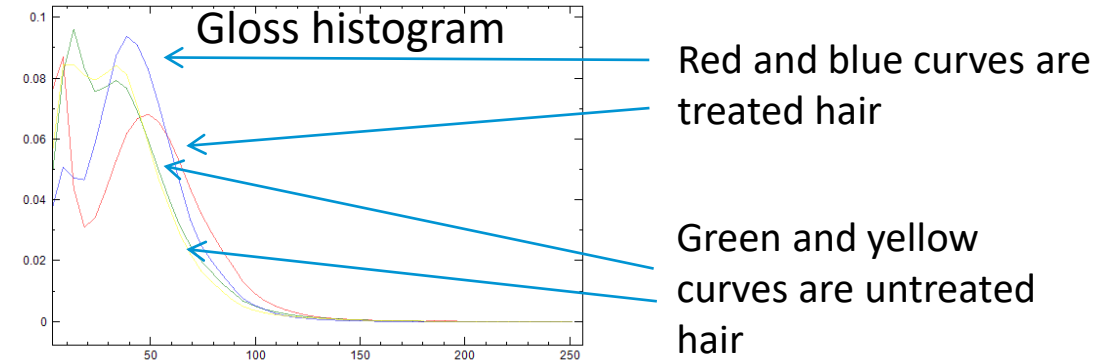
Hair gloss measured with Videometer Multiray



Multiray gloss image



Example of hair ridge segmentation



Videometer MiniLab 0.2

- 12 Mpix camera
- 7 wavelengths 405-850 nm
- Field-of-view 90x90 mm
- 270x220x200 mm, handheld, and wireless
- One click reflectance calibration
- Integrating sphere illumination
- Easy to use
- Cloud-based through wifi (or 4G/5G) option
- Expected Q2 2021

