

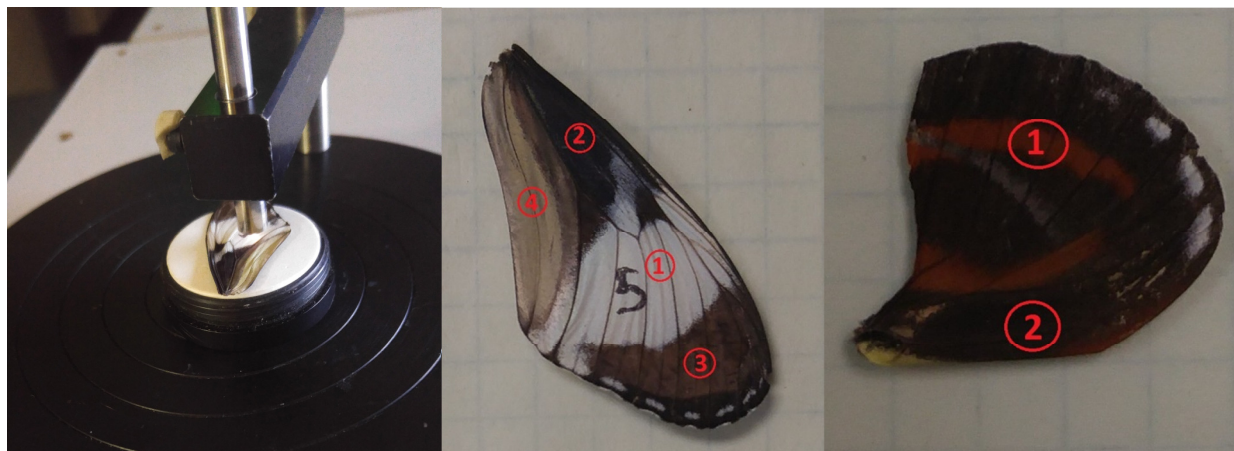
Reflection Measurements of Butterfly Wing Patterns

Butterflies are known for their beauty and vivid color patterns. Biologists are interested in measuring the reflectance of butterfly wings in the ultra-violet and visible ranges to better understand the species and its interaction with its ecosystem. Avantes systems can be used effectively for measuring such delicate biological samples. Avantes recently did some testing with some customer provided samples and the results were quite impressive.

Equipment and Setup:

An Avantes AvaSpec-2048L spectrometer was used in combination with a 400 μ m core UVIR broadband reflection probe and our high power AvaLight-XE light source to perform the reflection measurement.

The reference for the measurement was a WS-2 diffuse white reference tile which was held in a fixed position on the Thin Film Stage and used as the surface on which the sample was placed. Below are some images of the sample set up and samples.



Reflection Measurement

Sample 1

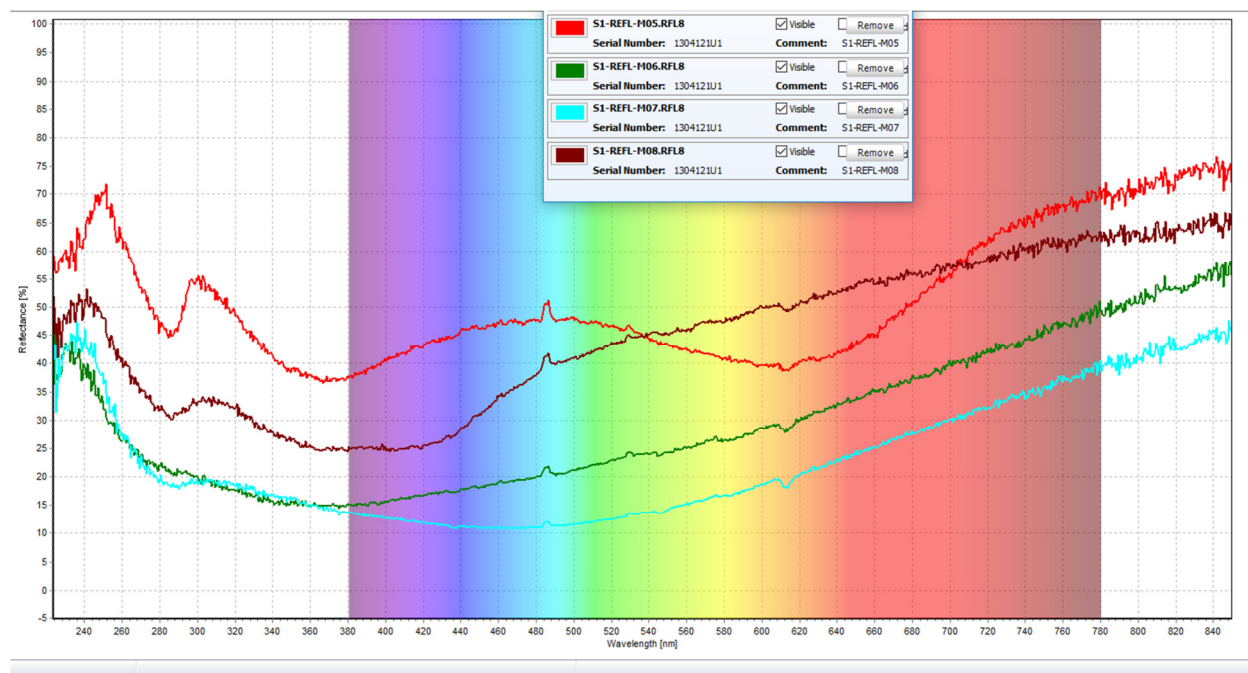
Sample 2

Procedure:

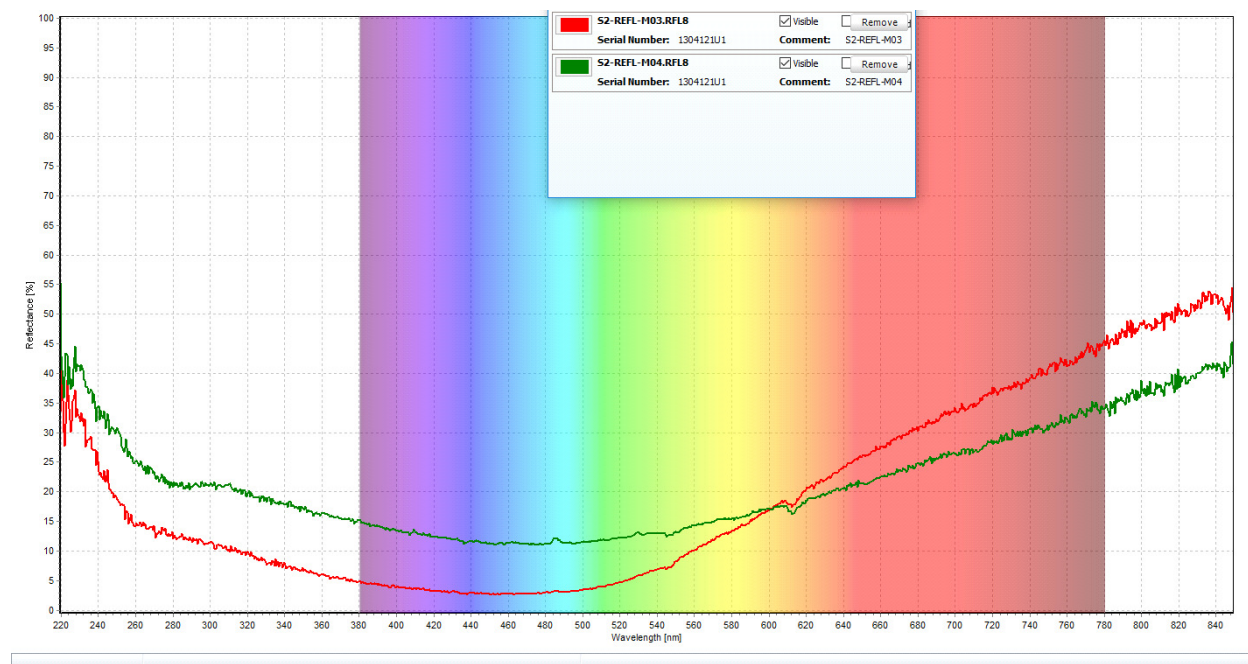
Keeping the reference tile in a fixed position a butterfly's wing was measured at multiple locations. The locations of choice were those which showed obvious differentiation from other parts of the wing. A dark and reference was taken with the WS2 white reference tile. The percent reflectance was then measured on the samples.

Observations:

There were noticeably different distinctions between the measurement spots across the butterfly's wings. Locations 1-4 are shown in Figure 1 and locations 1-2 correlate to Figure 2. Figure 1 exhibits spectral features (peaks) in the ultraviolet and visible while Figure 2 which measures a much darker sample has fewer notable features and much lower reflectance values.



Reflection Spectra – Figure 1



Reflection Spectra – Figure 2

Taking the Lab Into the Field:

To facilitate field measurements of this type, Avantes offers portable carrying cases for the spectrometer, light source and fiber optics. The AvaSpec instruments and light sources can be powered in the field via our line of battery packs or in the case of the spectrometer via laptop USB connection. The AFH-Ocular is a unique accessory for holding a small tipped (1.5 mm diameter) fiber optic probe (see image below) which facilitates visualizing the measurement spot for a measurement during the actual measurement.



For more information about Avantes solutions for biological measurements in the lab or on the field, please contact a Sales Engineer at info@avantes.com in EMEA or APAC or infousa@avantes.com in North America.