



For online and offline reflective color measurements, AvaSoft-COL is the ideal companion. This application provides a precise way to perform color measurements using the basic principles and techniques defined by the International Commission on Illumination (CIE). The CIE 1976 L\*a\*b\* color parameters are calculated, along with other parameters, like Hue, Chroma and X, Y, Z.

These parameters can be displayed in a CIELAB chart or in a graph versus time. Another possibility is saving the measured L\*a\*b\* values to an online database and using one of the products from the database as a reference color. Color differences ( $\Delta E_{Lab}$ ,  $\Delta L^*$ ,  $\Delta a^*$ , or  $\Delta b^*$ ) are made through comparing the measured L\*a\*b\* values to the stored database values.

The color of an object can be expressed by the CIE 1976 (L\*a\*b\*) color space. L\* describes the brightness of the color. A positive value of a\* describes the redness of the color, a negative a\* the greenness. Similarly, yellowness is a positive b\*, where blue is a negative b\*. The L\*a\*b\* values are derived from the CIE tristimulus values X, Y and Z of the sample (object) and the standard illuminant tristimulus values  $X_n$ ,  $Y_n$  and  $Z_n$ .

The standard illuminant tristimulus values for  $X_n$ ,  $Y_n$  and  $Z_n$  are constant and depend only on the type of standard illuminant that has been chosen.

The CIE tristimulus values X, Y and Z of the color of an object are obtained by multiplying the relative power P of a standard illuminant, the reflectance R (or the transmittance) of the object, and the 1931 or 1964 CIE standard observer functions  $x_n$ ,  $y_n$  and  $z_n$  (2 and 10 degree angles). The integral of these products over all the wavelengths in the visible spectrum (380 to 780 nm with a 5 nm interval) gives the tristimulus values.

## Color chart

The color chart display features:

- Display in CIELAB chart, the actual sample color as well as the reference color with the corresponding  $\Delta E_{Lab}$ ,  $\Delta L^*$ ,  $\Delta a^*$ , or  $\Delta b^*$  values are displayed and saved as well.
- The settings for the LAB chart display can be changed, such as no graphical display of reference and sample color in order to speed up the measurements.
- The standard observer angle is selectable for 2° or 10°.
- The reference color can be saved to and loaded from a color database. The database contains, apart from all color parameters, a product ID and a display of the actual color. The database can be sorted alphabetically or in either value column.

## Time series

The time series display has following features:

- Display in time series can be selected for any number of channels.
- For each channel a color parameter (L\*, a\*, b\*, hue, C, X, Y, Z,  $\Delta E_{Lab}$ ,  $\Delta L^*$ ,  $\Delta a^*$ , or  $\Delta b^*$ ) can be selected. For each channel a different reference color can be selected, enabling color sorting.
- For each channel the time axis can be set to a different scale, allowing simultaneous display of long time and short term monitoring of the same parameter.
- For each channel the actual measured color, as well as the reference color (if in  $\Delta E_{Lab}$ ,  $\Delta L^*$ ,  $\Delta a^*$ , or  $\Delta b^*$  mode) is displayed.
- The saved time series data can be displayed with extensive zooming and dragging options.

## Ordering Information

**AvaSoft-COL**

• Color application add-on software, to be ordered with AvaSoft-Full

**AvaSoft-All**

• Full version AvaSpec software (includes AvaSoft-COL, -IRRAD, -Raman and, -ThinFilm)