

Near IR with the DSM CD

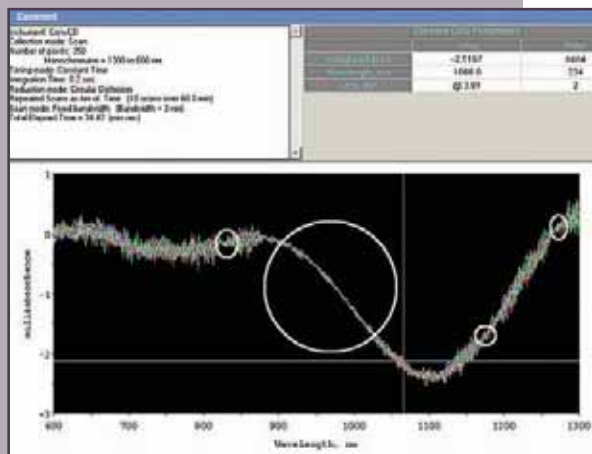


Figure 1.

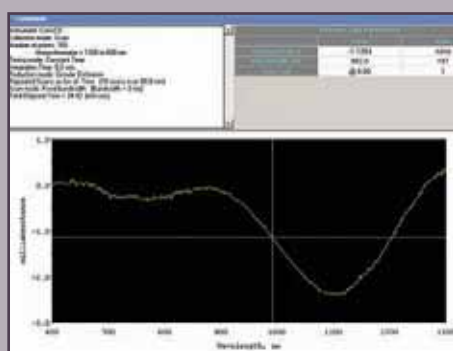


Figure 2.

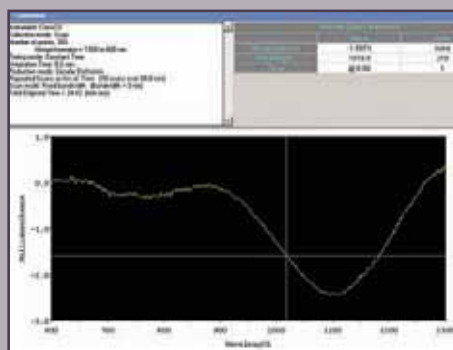


Figure 3.

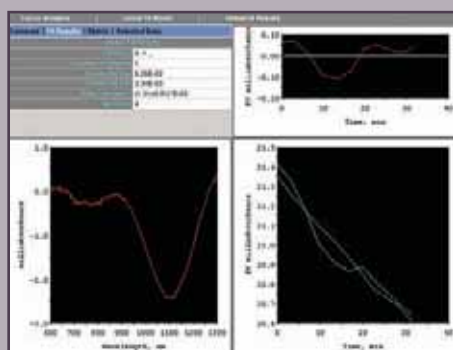


Figure 4.

The **Olis® DSM 17 CD** supports NIR detection to 1700 nm using large area (12.5 mm²) InGaAs detectors with unique and innovative preamplifier circuitry. An exclusive photoelastic modulator (PEM) made for Olis, Inc. provides the left and right circularly polarized deep into the NIR.

Unlike all other CD spectrophotometers, the Olis DSM 17 CD is successful producing useful low noise CD results deep into the NIR. The default configuration is the PMT and an InGaAs installed side by side, either one being used for UV/Vis or NIR, respectively.

However, this is to use the OLSI DSM CD in a single beam model. Better, especially in the NIR region, is to operate in the available dual beam mode, where the vast intensity differences from wavelength to wavelength by the xenon arc lamp are seen by both beams and thus referenced out.

Ten scans of 0.12 Molar nickel tartrate were collected in a grand total of 34 minutes, 42 seconds using an integration time of 0.2 seconds per datum across the 1300-600 nm span.

The variable noise levels along this wide span are reminders of the sharp lines of the 150 watt xenon arc lamp. The emission in the lamp output varies by about 30-fold over this range! Only a dual beam spectrophotometer deals with this high variance correctly, such that only the noise level is affected. The highest intensity regions return the lowest noise (circled).

Single beam acquisition CDs are troubled by the sharp and dramatic intensity variations in the NIR. Quoting Mr. Castiglione, an internationally respected CD expert who published applications notes for Jasco Europe, "Xe lamps, while showing a continuous spectra in most of the UV-Vis range, over 750 nm have strong emission lines, which may create problems in obtaining proper CD signals (which is coming from AC/DC ratio).¹

The Olis DSM CD spectrophotometers—collecting CD not from an AC/DC ratio, but from a direct dual beam acquisition of ABS(L) and ABS(R)—deal with strong emission lines correctly and easily.

In your hands these ten scans might be averaged together with Olis software (**Figure 2**). The Olis software also supports applying global analysis (SVD, etc.) to remove the noise (**Figure 3**). And, if these ten scans were changing because the sample was undergoing a chemical or thermal reaction, you could use the Olis global fitting software to calculate rate constants, enthalpy values, transition wavelengths, and other equilibrium and kinetic values associated with changing spectra (**Figure 4**).

Footnotes

1) ECS Technical Report No. 19 July 2000: "Near NIR-CD"