

## NEAR NIR-CD

With Near NIR-CD we define the wavelength range still covered by commercial CD spectropolarimeters (from 750 up to 1000-1200 nm), but already part of the near infrared region.

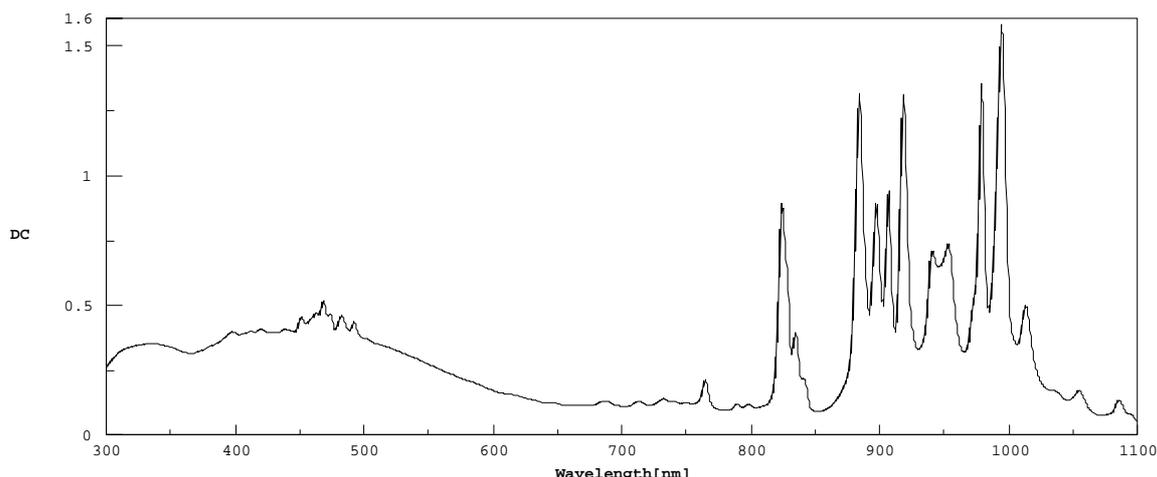
Many CD users will never reach these wavelengths, probably 50% of you will occasionally scan over 300 nm, but people involved in metal complexes and in other fields are potentially and practically interested.

There are potential difficulties here, we would like to stress as follows:

- double prism monochromators as used on commercial units exhibit low linear dispersion in this range, which calls for narrow slits/low energy in this region
- 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)
- Red extended photomultiplier tubes (S1 response, able to reach 1100 nm) are significantly less sensitive than the normal ones for standard for UV-VIS range

All these factors are simultaneously acting, so this range is by sure more difficult than the standard UV-VIS one, which for all commercial units have been designed.

Next figure shows energy spectra obtained on a commercial unit (a Jasco J-715 in this case) run at 2 nm bandpass, detecting the light level with a quartz window Si diode (Hamamatsu S2386-5K).



If you consider that diode spectral response reaches its top close to 1000 nm and is 1/3 at 400 nm, you'll see how efficiency is lost while moving toward the NIR and, at the same time, how strong are the Xe lamp emission lines over 800 nm. Since diode chromatic response is opposite to monochromator efficiency, we proposed in the past<sup>1</sup> the use of Si diode in place of S1 photomultiplier tubes for the NIR range. System works, but using a diode you miss the dynode feedback automatic sensitivity adjustment which is able to keep constant DC regardless the strong Xe emission bands.

So, a diode can be effectively used from 1100 to about 300 nm only when working with relatively large bandpasses (10 nm), smoothing effectively in this way the sharp emission peaks.

With regard to data processing, early CD units were able to collect AC (lock-in amplifier output) and DC (unmodulated component) separately, so correct CD spectra display (AC/DC) was possible only by after-run data processing. The new Jasco J-810 has AC/DC measuring mode as standard, so corrected data are directly collected.

So diode detectors are now of more practical use and should be considered as effective alternative to S1 PM tubes, also for the much lower cost, in cases in which a narrow bandpass is not required.

1 Castiglioni E. 6<sup>th</sup> Intern. Conference on Circular Dichroism, Pisa, Sept 97, poster B2