

ADVANCED APPLICATIONS OF VIBRATIONAL CIRCULAR DICHROISM: FROM SMALL CHIRAL MOLECULES TO FIBRILS

RINA K. DUKOR, *R&D, BioTools, Inc., Jupiter, FL, USA.*

Vibrational Circular Dichroism (VCD), first discovered in the early 1970s, and commercialized in the late 1990's, is finally coming of age! No longer a curiosity of the few selected academic groups, it is now used by all major pharmaceutical companies, regulatory agencies, government labs and academic institutions. The main application for the technology has been determination of absolute configuration of small pharmaceutical molecules. In more recent years, this has extended to more complicated molecules such as natural products with many chiral centers and conformational flexibility. Other applications include determination of enantiomeric purity, chiral polymers, and characterization of other biological molecules such as proteins, carbohydrates and nucleic acids.

One of the most fascinating discoveries in the VCD field has been unusual enhancement in intensity for proteins that form fibrils. We have demonstrated sensitivity of VCD to in situ solution-phase probe of the process of fibrillogenesis and subsequent development that currently can only be studied in detail with dried samples by such techniques as scanning electron microscopy or atomic force microscopy. We have further shown that several different proteins, that in their native state have different secondary structures, have a very similar unique signature of mature fibrils.

In this presentation, we will discuss fundamentals of VCD, demonstrate a few examples of different applications and showcase the sensitivity to structure of fibrils, including new results on micro-sampling.