CHIRALITY RECOGNITION/TRANSFER/AMPLIFICATION: ROTATIONAL SPECTROSCOPIC AND CHIROPTICAL SPECTROSCOPIC STUDIES

YUNJIE XU, *Department of Chemistry, University of Alberta, Edmonton, AB, Canada*.

A molecule is chiral if its mirror image cannot be superimposed onto itself. Chirality serves an essential function in life. Our research program centres on understanding mechanisms of chirality recognition/transfer/amplification at the molecular level. To achieve this goal, we apply and develop new spectroscopic tools to characterize structural and dynamical properties of chiral molecules and non-covalent interactions among them in the gas phase, solution, cold rare gas matrices and at liquid-liquid interfaces.

We emphasize the connection between the gas phase and condense phase results obtained using high resolution spectroscopy and several chiroptical spectroscopies, respectively. For example, we examined the conformational landscape and chirality recognition in the binary adducts of tetrahydro-2-furoic acid using chirped pulse Fourier transform microwave spectroscopy. The unusual conformational distributions and chirality controlled conformational preferences will be discussed. Using vibrational circular dichroism, we followed the first few steps of self-aggregation of this acid in cold rare gas matrices and compared the results to those obtained in the gas phase and in solution previously. In the second example, I will discuss the unusually strong solvent 'Raman optical activity' features observed in a solution of a chiral nickel complex even though the solvent is achiral and the search for its origin. The interplay between experiment and theory is essential for all the work described.