Synchrotron radiation enantioselective ARPES studies of intrinsic properties of chiral free molecules

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Molecular dissymmetry on macroscopic and microscopic scale plays a crucial role in life science. The unknown origin of the homochirality in terrestrial life and the high enantio-selectivity in processes involving biologically relevant chiral molecules are quite intriguing aspects to study in natural phenomena and related technologies. Studying of molecular enantiomeric nature may therefore have a strong impact in chemistry. Relatively few investigations using ionizing radiation have hitherto been accomplished to study chiral systems. Development of third generation photon sources like synchrotron radiation facilities has allowed intense radiation with high degree of circular polarization to be used in experiments. Such sources can reveal Circular Dichroism in randomly oriented chiral molecules by photoabsorption and photoionization (ARPES) involving valence or inner-shell electrons. Significant results obtained by ARPES and related techniques studying enantiomers of oxirane derivatives [1-4], as model chiral systems, will be shown along with predictions of state-of-the-art theoretical calculations [5]. Perspectives in these studies will also be discussed.

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