Enantiomeric Excess Sensitivity to Below One Percent by Using Femtosecond Photoelectron Circular Dichroism

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The asymmetry of photoelectron angular distributions (PADs) from randomly oriented enantiomers of chiral molecules in the ionization with circularly polarized light arises in forward/backward direction with respect to the light propagation. This effect was termed Photoelectron Circular Dichroism (PECD) and so far investigated using synchrotron radiation [1]. We observed highly structured asymmetries in the range of ± 10% on bicyclic Ketones [2, 3]. Due to the multi photon ionization (MPI), high order Legendre polynomials appear in the measured PADs.

Photoelectron circular dichroism (PECD) is investigated experimentally on chiral specimen with a varying amount of enantiomeric excess (ee). The quantification of these measurements shows a linear dependence with respect to ee. In addition, a distinction of differences in the ee (denoted as detection limit) below one per cent for nearly enantiopure samples as well as for almost racemates is demonstrated [4].