

IMAGING THE PHOTOELECTRON CIRCULAR DICHOISM EFFECT IN THE PHOTODETACHMENT OF MASS SELECTED CHIRAL ANIONS

JENNY TRIPTOW, ANDRE FIELICKE, GERARD MEIJER, MALLORY GREEN, *Department of Molecular Physics, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany.*

PhotoElectron Circular Dichroism (PECD) is a forward/backward asymmetry in the angular photoemission of an electron from a non-racemic sample, upon irradiation by circularly polarized light. In comparison to other chiroptical effects (e.g. absorptive circular dichroism), this effect is not reliant on weak interactions with the molecule's magnetic moment, which leads to a significant increase in the sensitivity to the molecule's chirality. This characteristic holds promise for analytical techniques, which target the study of dilute chiral samples. Additionally, the use of anions for this technique would allow for mass-selectivity and enable simple experimental schemes that employ table-top light sources, leading to a potentially robust analytical tool for chiral discrimination of multicomponent gas-phase samples. Support for PECD in anion photodetachment is limited, and knowledge of the forces that govern PECD electron dynamics in this photoemission process is missing. By coupling pre-photodetachment mass selection, tunable detachment, and velocity-map imaging-anion photoelectron spectroscopy, we provide an energy-resolved PECD signal for mass-selected anions, for the first time: In the study of the deprotonated 1-indanol anion we observed a PECD effect for many detachment channels, and a maximum PECD effect of 11%, which is similar to what has been measured for neutral species.¹ This work marks the first steps to understanding this chiral effect in this new photoemission regime.

¹Triptow, J., Fielicke, A., Meijer, G., Green, M. (2023). Imaging Photoelectron Circular Dichroism in the Detachment of Mass Selected Chiral Anions. *Angew. Chem.* 62, e2022120.