

## Photo-CIDNP for High Throughput Drug Screening

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Photo-chemically induced dynamic nuclear polarization (photo-CIDNP) is a promising solution to the inherent lack of sensitivity in NMR spectroscopy. It is particularly interesting in biological systems since it operates in water, at room temperature, and it can be repeated if the bleaching of the system can be controlled. However, the photo-CIDNP signal enhancement is well below those of other hyperpolarization techniques. While DNP, PHIP, and SABRE reach polarization enhancements of  $10^3$  to  $10^4$ -fold, photo-CIDNP enhancement is typically only one order of magnitude for  $^1\text{H}$  and two orders of magnitude for  $^{13}\text{C}$  in the amino-acids tryptophan and tyrosine. We recently reported on a novel dye ligand pair with Atto Thio 12 and HOPI, which is a photo-oxidation product of tryptophane, getting a  $^1\text{H}$  signal enhancement of 120-fold at 600 MHz, 380-fold enhancement at 200 MHz and over 1200 fold enhancement on  $^{13}\text{C}$  [1,2]. In addition, we started to build up a small molecule chemical library of ca 200 photo-CIDNP active compounds [3] and demonstrated, that photo-CIDNP enhancement is inversely related to ligand protein binding establishing a novel approach to screen for lead compounds in drug research. Using a flow cell-based approach 1000 compounds per day can be screened for qualitative and eventually quantitative ligand affinity studies of small molecules binding to any protein target of interest.

### References should be listed as below

[1] Torres *et al.*, *Phys Chem Chem Phys.* **23**, 6641 (2021)

[2] Sobol *et al.*, *J. Chem. Phys* 151, 234201 (2019)

[3] Torres *et al.*, *Magn. Reson.* **2**, 321 (2021)