New Non-Fullerene Acceptor-based Materials for Circularly Polarized Light Detection

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Photodetectors that can convert circularly polarized light into electrical signals, have different applications in satellite communication, 5G technologies, and more advanced sensing technologies. One way to achieve circularly polarized light detection is to use materials which can directly discriminate between left- and right-handed circularly polarized light.[1] A promising material class for this application are Non-Fullerene Acceptors (NFAs) which are typically used as acceptor materials in organic photovoltaics. As *Wan et al*.[2] and *Liu et al*.[3] have shown, these NFAs can be used in circularly polarized light detectors by mixing them with a chiral inducer (g_{abs} = 0.15)[2] or by introducing chiral alkyl side chains (g_{abs} = 0.04).[3]

In this work, the interactions between the chiral inducer and the NFA are further investigated, and new chiral materials are synthesized to optimize the chiroptical properties and the device performance of circularly polarized light detectors. A simple chiral NFA was already synthesized which shows a promising absorption dissymmetry factor of up to g_{abs} = 0.24 as a pristine thin film on glass and promising performance with **PBDB-T** in BHJ-photodiodes.

References:

[1] M. Schulz et al., Adv. Funct. Mater. 2019, 29, 1900684.
[2] L. Wan et al., Nat. Photon. 2023, 17, 649–655.
[3] L. Liu et al., Small 2022, 18, 2202941.