Photothermal circular dichroism studies of single nanoparticles

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Stellingen

behorende bij het proefschrift

'Photothermal circular dichroism studies of single nanoparticles'

1. The circular dichroism of supposedly achiral particles can be as large as the circular dichroism of tailor-made chiral particles.
   Chapter 2 and 4 of this thesis.

2. "Spherical nanoparticle" is a unfortunate choice of name and leads to misconceptions. "Quasi spherical" or "sphere like" would be better suited.
   Chapter 4 of this thesis.

3. Circular dichroism in absorption measurements can significantly differ from circular dichroism in extinction measurements.
   Chapter 5 of this thesis.

4. Despite its superior sensitivity for single-particle measurements, PT-CD has one disadvantage compared to extinction methods based on Mueller matrix polarimetry: it cannot differentiate between "extrinsic" chirality and "intrinsic" chirality.
   Chapter 4 of this thesis.

5. The circular dichroism signal of a single chiral nanoparticle is not representative in any way for the circular dichroism of a colloidal solution of such chiral particles.
   *González-Rubio et al., Science **368** 1472-1477 (2020).*

6. To probe a PCCD effect on a single nanoparticle, one should show the inversion of sign of circular dichroism upon inverting the handedness of the molecule involved. Showing circular dichroism measurements with just one handedness is insufficient.
   *Zhang et al., Science **365**, 1475-1478 (2019).*

7. A perfect square-wave modulation of polarization to study circular dichroism, although desirable, is not suitable for single-particle measurements.
   *T. Narushima, H. Okamoto, Scientific reports, **6**, 1-10; Spaeth et al., Nano Lett. **12**, 8934-8940 (2019).*

8. Plasmonic nanoparticles are not suitable to probe the CD signal of small quantities of molecules, as their own CD by far overshadow the molecular one.
   *Schäferling et al., Physical Review X **2**, 031010 (2012); García-Guirado et al., Nano Lett. **10**, 6279–6285 (2018).*

9. For an experimental physicist it is admissible not to understand a problem as long as (s)he can solve it.

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