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T-CYCLE EPR Development at 275 GHz for the study of reaction kinetics & intermediates

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Stellingen

behorende bij het proefschrift

T-CYCLE EPR: DEVELOPMENT AT 275 GHZ FOR THE STUDY OF REACTION KINETICS & INTERMEDIATES.

1. *Temperature-Cycle EPR, coupled with the “Sub-zero mixing” technique, can and must replace Rapid Freeze-Quench EPR.*

Chapters 4 and 5.

2. *Although well-established in the field of EPR, Rapid Freeze-Quench is a troublesome and effortful technique when it comes to sample reproducibility; it must be substituted by easier and more efficient methods.*

Chapter 2.

A. Collauto *et al.*, *Phys. Chem. Chem. Phys.*, 19, 15324–15334, **2017**.

3. *In T-Cycle EPR, the use of sapphire capillaries, instead of quartz ones, will make the cooling of the sample following a laser pulse much faster, even for bigger volumes. This could enable the use of this technique at lower microwave frequencies, such as 95 and even 9.5 GHz.*

Chapter 4.

4. *In T-Cycle EPR, optimizing the amount of light absorbed by the sample in the EPR cavity allows considerably larger T-jumps, thus improving the time resolution of the technique by orders of magnitude.*

Chapters 2 and 3.

5. *Although ingenious and abundant, all solutions to minimize microwave loss and optimize signal-to-noise ratio in high-frequency EPR spectrometers depend strongly on the specific application; efforts should be made in the EPR community to standardize high-frequency EPR instrumentation, thereby increasing their usability.*

S. Milikisoyants *et al.*, *J. Magn. Reson.*, 296, 152–164, **2018**.

6. *The reversible guest release by photoswitchable host molecular systems can be coupled to T-Cycle EPR, allowing kinetic investigations from the moment the reaction is started by a light pulse.*

S. M. Jansze *et al.*, *Chem. Sci.*, 9, 4253–4257, **2018**.

S. Wiedbrauk *et al.*, *Nat. Commun.*, 9, 1456, **2018**.

7. *Persistent-luminescence phosphors have the potential to play an important role in landscape, urban, and traffic lighting.*

H. Guo *et al.*, *J. Mater. Chem. C*, 5, 12090–12096, **2017**.

8. *Manga and anime artworks may soon be automatically generated to match the audience’s favorite styles and tastes, which can be identified and categorized by employing algorithms based on physics-inspired metrics.*

H. Y. D. Sigaki *et al.*, *PNAS*, 115, E8585–E8594, **2018**.

Gabriele Panarelli
Leiden, 10th December 2018