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Two-photon luminescence of gold nanorods: applications to single-particle tracking and spectroscopy

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Stellingen

behorend bij het proefschrift

Two-Photon Luminescence of Gold Nanorods *Applications to Single-Particle Tracking and Spectroscopy*

1. A detailed characterization of the accuracy of the analysis method is particularly important when studying stochastic processes like diffusion.

Chapter 2 of this thesis

2. Gold nanorods exhibit the same mobility in the cytoplasm as in the nucleus of HeLa cells.

Chapter 3 of this thesis

3. The plasmon-enhanced luminescence of gold nanorods is known for its excellent photostability. Nevertheless, in live cells gold nanorods luminescence shows unexpected instability.

Chapter 3 of this thesis

4. The diffusion coefficient of gold nanorods in live cells is three orders of magnitude lower than predicted by the Stokes-Einstein relation.

Chapter 2, 3 and 4 of this thesis

5. Most research involving gold nanorods is in the biomedical field. More attention should be devoted to other applications of the sensing properties of gold nanorods, such as the detection of pollutants.

Wang et al., Trends in Anal. Chem. 80 429-443 (2016)

6. Recent experiments showed that the uptake of gold nanorods by living cells is influenced not only by their size, but also by their aspect ratio. Future experiments can benefit from taking this parameter into account when choosing gold nanorods.
Kinnear et al., Nanoscale **8** 16-26 (2016)
7. Kaneti *et al.* present a biocompatible carbon coating as an alternative to polyethylene glycol coating of gold nanoparticles, with the advantage of tunable thickness. The functionalizability of gold nanoparticles with these two coatings should be compared.
Kaneti et al., Appl. Mater. Interfaces **7** 26658-25668 (2015)
8. Recent long-term toxicity results contradict the widespread assumption that gold nanorods are non-toxic. More research is needed to investigate the long-term toxic effects of gold nanorods in different cell lines and as a function of gold nanorod geometry.
Falagan-Lotsch et al., PNAS **113** 18-23 (2016)
9. The publication of negative results can spare fellow researchers a large amount of time, money and effort.
10. Time pressure is the biggest hurdle for a successful PhD research project.

Sara Carozza
Leiden, July 4 2017