Photothermal studies of single molecules and gold nanoparticles : vapor nanobubbles and conjugated polymers

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Stellingen

behorende bij het proefschrift

Photothermal Studies of Single Molecules and Gold Nanoparticles:
Vapor Nanobubbles and Conjugated Polymers
door
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1. The boiling temperature of a liquid surrounding a gold nanoparticle shifts to a much higher value compared with ambient conditions, because of the large Laplace pressure at the nano scale. (*Chapter 2 of this thesis*)

2. Vapor nanobubbles are highly dynamical under continuous heating, and the dynamics unfolds on the nanosecond time scale. (Chapter 3 of this thesis)

3. Vapor nanobubbles are sensitive to weak perturbations such as acoustic waves. The acoustic wave released by the vapor nanobubbles and reflected by the environment can trigger new explosions in the hot liquid layer surrounding the particle. (*Chapter 3 of this thesis*)

4. Given the large photothermal signal in near-critical xenon, excitation powers can be lowered to values that are compatible with the single-molecule detection of conjugated polymers. (*Chapter 5, 6 of this thesis*)

5. The conclusion of Shpak *et al.* that dissolved gas in the liquid prevents the recondensation of vapor bubbles at the collapse stage, might also apply to persistent vapor nanobubbles. [*Shpak et al. Phys. Med. Biol.* ***58****, 2523 (2013)*]

6. Microbubbles are a good contrast agent for ultrasound imaging. [*Errico et al. Nature* ***527****, 499 (2015)*]

7. The similarity of plasmonic nanoparticles with molecules, noticed by Guerrero-Martínez *et al.*, suggests the use of the concepts from molecular theory to understand the properties of plasmonic nanoparticles.
   [*Guerrero-Martínez et al. ACS Nano* ***6****, 3655 (2012)*]

8. The conclusion of Habuchi *et al.* that emitting sites in a single conjugated molecule poly[2-methoxy-5-(2-ethylhexyloxy)-1, 4-phenylenevinylene] (MEH-PPV) embedded in Zeonex distribute nearly uniformly regardless of the molecular weight, is only valid for molecules that have a collapsed conformation.
   [*Habuchi et al. Phys. Chem. Chem. Phys.* ***13****, 1743 (2011), Steiner et al. Phys. Rev. Lett.* ***112****, 137402 (2014)*]

9. Earthquakes are unpredictable because of the lack of statistics.

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Leiden, 14 June 2016