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Lipid bilayers decorated with photosensitive ruthenium complexes

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Propositions (Stellingen)

accompanying the thesis

Lipid bilayers decorated with photosensitive ruthenium complexes

1. Yellow photons seemingly do not have enough energy to populate the ¹MLCT state of a polypyridyl Ru(II) complex ($\lambda_{max} \sim 450$ nm), but they can actually trigger a photosubstitution reaction with almost the same quantum yield as that achieved with blue photons.

This thesis, Chapter 6

2. The dissociative interchange mechanism usually proposed for the thermal substitution of monodentate ligands in polypyridyl Ru(II) complexes, is not always correct.

Takeuchi, et al., Inorg. Chem. 1993, 32, 5779; This thesis, Chapters 3

3. Introducing more steric hindrance on a polypyridyl Ru(II) complex not only leads to a higher rate constant (k_i) for the hydrolysis (aquation) of a thioether ligand, but also results in a faster binding of the thioether ligand back to the ruthenium complex.

This Thesis, Chapter 2 and 3

4. Observing an interaction between a positively charged metallodrug and negatively charged biomolecules such as lipids, DNA, or proteins, at a short time scale, does not necessarily mean that the metal binds to the biomolecule.

This Thesis, Chapter 4

5. The charge of a metal complex is not the only factor determining its interaction with phospholipid membranes.

Israelachvili, et al., Biochemistry 1993, 32, 1127; Hinch, et al., Biochim. Biophys. Acta, Biomembr. 2003, 1611, 180; This Thesis, Chapter 4

6. Counter-intuitively, adsorption of positively-charged ruthenium complexes at the surface of a negatively charged lipid membrane is entropy driven and endothermic.

This thesis, Chapter 4

7. As NAMI-A has antimetastatic properties and is poorly cytotoxic, having a lower IC₅₀ than NAMI-A is not a performance for cytotoxic metallodrugs.

Paduano, et al., Biomaterials 2012, 33, 3770

8. In the Förster Resonance Energy Transfer mechanism the FRET donor does not always have higher energy than that of the FRET acceptor.
Etchenique et al., Photochem. Photobiol. Sci. 2012, 11, 843; Woolley et al., Biophys. Chem. 1987, 26, 367
9. Experimental recipes in cell biology are not as precisely described as that in synthetic chemistry. This makes the life of a synthetic chemist a bit difficult if he/she wants to cross the chemistry borders.
10. Working in a multidisciplinary area is a great opportunity to meet more scientists with broad research interests, learn more techniques, and make more friends!

Azadeh Bahreman
Leiden, December 2013