

Cover Page



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Title: Q-wires': Synthesis, electrochemical properties and their application in electro-enzymology

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STELLINGEN

Behorende bij het proefschrift:

'Q-wires': Synthesis, electrochemical properties and their application in electro-enzymology

1. The unpredictability of the Grubbs olefin metathesis reaction encountered in chapter 2 and 3, suggests that this reaction should be considered a last resort in OPV synthesis
2. Although chapter 4 focuses on electron transfer kinetics, it is predominantly proton kinetics that determine the overall reaction rates of the *Q-wires*
3. The inclusion of an sp^3 carbon in the *Q-wire* design is required to ensure biocompatibility, even though it adversely affects electron transfer rates (chapter 2-5)
4. In an enzymological context, the seemingly rate-limiting apparent electron transfer rate constants k_{app} may not be of particular relevance (chapter 4, 5)
5. Once fully optimized, a single electrode treated in a similar fashion as described in chapter 5 could be used to probe enzymatic processes under many different (and extreme) circumstances
6. Although presented as such, the fully conjugated wires introduced in Lebedev's work are *not* OPV-tethered hydroquinone moieties; these wires as a whole should be viewed as redox-active molecules instead
SA Trammell, DS Seferos, M Moore, DA Lowy, GC Bazan, JG Kushmerick, N Lebedev, Langmuir 2007, 23, 942-948
7. In addition to supporting proposition 6, the observation that two fully conjugated hydroquinone-terminated OPV wires of

different length exhibit comparable electron transfer rate constants, favors Dutton's edge-to-edge model for describing the distance dependence of electron transfer rates between two redox groups

CC Moser, CC Page, PL Dutton, Phil. Trans. R. Soc. B 2006, 361, 1295–1305

8. The electron transfer rate constants obtained by performing a 'Laviron analysis' are not suitable for determining a decay constant (β), as evidenced by the erroneous value $\beta \approx 0 \text{ \AA}^{-1}$, derived for a series of hydroquinone-terminated alkane thiol wires of different length, measured under alkaline conditions
H Hong, W Park, Bull. Korean Chem. Soc. 2005, 26, 1885-1888
9. The system introduced by Jeuken, in which cytochrome bo_3 -enriched cytoplasmic membrane fragments are tethered to the electrode surface, may be improved when *Q-wires* are used instead of soluble, diffusing substrate analogues
SA Weiss, RJ Bushby, SD Evans, LJC Jeuken, Biochimica et Biophysica 2010, 1797, 1917-1923
10. A disadvantage of performing multidisciplinary research is that one may never fully develop an adequate theoretical understanding of all the involved scientific fields
11. When normalized for efficiently invested time and effort, the 'research volume' ($V = L \times D \times B$) may be quite constant among different research projects, where L is the invested amount of lab work, D is the theoretical depth and B is the broadness of the subject. For instance, the work presented here may be classified as $L \geq B > D$