# Molecular and Nano-engineering with iron, ruthenium and carbon: Hybrid structures for sensing

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# List of publications

Published:

W. Fu, L. Jiang, E. P. van Geest, L. M. C. Lima, G. F. Schneider, *Adv. Mater.* **2017**, *29*, 1603610

E.P. van Geest, K. Shakouri, W. Fu, V. Robert, V. Tudor, S. Bonnet, G. F. Schneider, *Adv. Mater.* **2020**, *32*, 1903575

In preparation:

E.P. van Geest, P. van Deursen, L. Wu, N. Puthuval Prasad, T. de Haas, J.P. Hofmann, G.F. Schneider and S. Bonnet, *Large-area thin films of the spin crossover complex [Fe(bapbpy)(NCS)2] grown selectively on graphene.* In preparation for publication.

E.P. van Geest, H. de Bruijn, X. Liu, G. van Westen, S. Bonnet, and G.F. Schneider, *Polymer coated graphene-based gas sensors: chemical fingerprinting by simultaneous sensing.* In preparation for publication. Patent application filed.

E.P. van Geest, J. de Ruiter, D. van den Bos, C. Blet, J. van Ruitenbeek, G.F. Schneider and S. Bonnet. *Monitoring a ruthenium-based photoreaction with graphene on paper.* In preparation for publication.

E.P. van Geest, R. Versloot, S. Popal, P. van Deursen, L. Lameijer, S. Bonnet and G.F. Schneider. *Reducing the translocation speed of DNA in solid-state nanopores by photo-labile ruthenium complex decoration*. In preparation for publication.

E.P. van Geest, N. Salitra, S. Popal, R. Vadde, C. Van de Griend, G.F. Schneider and S. Bonnet. *$[Ru(3)(biq)(STF-31)]^{2+}$: A lock-and-kill anticancer PACT agent.* In preparation for publication.

R. Vadde, E.P. van Geest, W. Verbeet, *Metal complexes as anticancer drugs: intracellular targets and analytical techniques to detect metal-protein interactions.* In preparation for publication.

# Curriculum Vitae

Erik Pieter van Geest was born on the 23rd of March in 1991 in Naaldwijk, The Netherlands. He attended the high school ISW Tiendweg in Naaldwijk, where he received his degree with the specialization 'Natuur en Techniek' in 2009. In the same year, he started studying Molecular Science and Technology at Leiden University and TU Delft, with the Chemistry specialization. He received his BSc degree in 2012 with a thesis entitled "*Synthesis of palladium N-heterocyclic carbene complexes towards palladium-imido compounds*", after completing an internship (18 EC) at the MCBIM group. He started the MSc Chemistry at Leiden University in the same year. In 2014 he obtained his MSc degree with a major thesis entitled "Liposomes functionalized with ruthenium: towards a tumor-targeted, light-controlled anticancer drug" (40 EC) describing the results of research performed within the MCBIM group, followed by a minor thesis entitled "*An alternative synthetic route towards Akardite II"* (35 EC) describing the research performed at TNO in the Energetic Materials department.

Between 2014 and 2016 he worked at TNO, in the Energetic Materials department. In 2016, he started a PhD programme under the co-supervision of Prof. Dr. Sylvestre Bonnet and Dr. Gregory Schneider, at the interface between the MCBIM and SBC research groups. The results of this PhD research are described in this thesis, and were in parts presented as poster and oral presentations at the NWO CHAINS conference in Veldhoven (2017, 2018), at the 2017 Chem2DMat conference in Strasbourg (poster), and at the 2019 Nanotech France conference in Paris (oral). He had a supervisory role in the NWO-funded Team Slow-motion, which competed in the TOP-sector Chemie research competition Finals in 2018. As part of his PhD programme, he attended several events from the HRSMC, including the Physical methods in Inorganic Chemistry (PhMIC) course in 2017, the Advanced Metal Organic Chemistry and Catalysis (AMOCC) summer school in 2018 and Photophysics, Photochemistry and Photobiology (PPP) in 2019. Finally, he attended the Leiden University Graduate School courses on Time Management, How to be a Scientist, Communication in Science and Effective Communication.

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Most projects would not have progressed as much as they did without the help of collaborators. Khosrow, I still owe you a bottle of wine, thanks for all the work on chapter 2. Jan Philipp, Gabor, and Aurelian, thanks for the help with the measurements on the thin films for chapter 3 and Wim, thanks for the help with μ-contact printing. Xuhan and Gerard, thanks for the data analysis of chapter 4 that truly showed the potential of the CF sensors. Jan, thanks for the deep discussions we have had about the GFETs on paper from chapter 5. From the physics department, thank you Douwe and Federica, for making me accustomed to the amazing machines and setups that I have used.

I would like to thank the students that contributed to this thesis; their time and work significantly pushed the projects they were involved in forward. Reinout Ubbink and Ted de Haas contributed to chapter 3. Camille Blet, Daan van den Bos, and Jonathan de Ruiter contributed to chapter 5. Roderick Versloot and Sorraya Popal, as part of Team Slow-Motion contributed largely to chapter 6. Nadiya Salitra contributed to chapter 7. Lastly, Benjamin Oudot and Simon Chen contributed projects that sadly did not make it to this thesis. I'd like to thank all of you for the time spent, discussions that we had and the many things we learned from each other. I really enjoyed being your supervisor.

I'd like to give special thanks to Prof. dr. E. Bouwman, for all the time she put in reading this thesis and providing very useful feedback. Thanks a lot Lies, I really appreciate this.

Of course, I want to thank my own supervisors. Les Frenchies Sylvestre and Gregory, thank you for making my PhD very much fit for me, with lots of room to explore, a lot of freedom, and the occasional critical view on my various projects. I've enjoyed all the discussions we have had, whether scientific or not, and all the fun we had. Je m'apelle un croissant et non de jus plus maintenant! Merci, merci, merci. All the best for the future, and I'm sure I'll see you around.

Lastly, I'd like to thank my family and friends for their company, support and the time we have shared, which kept me going during my entire PhD. In the end, you helped me to keep my mind fresh and my enthusiasm up. Man, man, man, many thanks.