

# Preface and acknowledgements

This book is the final revised version of the thesis for which I obtained the “Doktorgrad (Doctor rerum naturalium)” from the “Georg-August-Universität Göttingen”. It summarizes the research I performed in the Macromolecular Chemistry Group of Prof. Dr. Philipp Vana at the “Institut für Physikalische Chemie” from 2010 to 2014. I am honored that this thesis was also awarded the Richard-Zsigmondy prize for Göttingen’s best chemistry thesis in 2014.

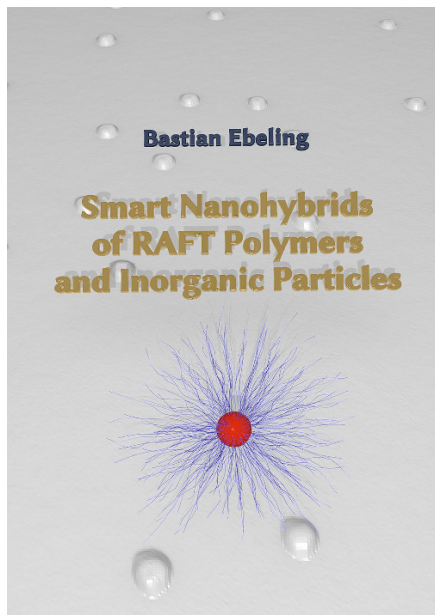
The underlying work would have been impossible to complete without receiving support and help in a number of different ways. Rather than hiding the acknowledgements at the end of this book, I feel that the only appropriate place to recognize several special people is in the very first pages.

First of all, I want to extend my sincerest thanks to my main supervisor Prof. Dr. Philipp Vana for his extraordinary scientific guidance, his incredible motivational capabilities, and for showing perpetual confidence in my skills.

I also want to thank my co-supervisor Prof. Dr. Hans-Ulrich Krebs for his friendly personal support and also as a representative for his group and the whole “Institut für Materialphysik”. The interdisciplinary cooperation was extremely valuable for me. It was especially helpful that I was given the opportunity to regularly work with their transmission electron microscope. Within the course of the presented studies, I took a large number of micrographs, several of which can be seen in this thesis and significantly contribute to the informative value of this work (most notably in Sections 4.1 and 5.1 and in Chapter 8.2). Dr. Peter-Joachim Wilbrandt and Matthias Hahn particularly helped me by offering plenty of assistance with the instrument and thoroughly refreshing my understanding in optics.

I would like to express my gratitude to Prof. Dr. Michael Buback for valuable and interesting discussions and for the opportunity to work with the high-pressure apparatus (Chapter 6). Concerning these experiments, Dr. Hans-Peter Vögele provided indispensable technical advice and Sandra Lotze and Heike Rohmann offered great practical support, for which I am also very grateful.

I thank Martin Eggers for his assistance in the creation of the script for the processing of AFM images (Section 4.2). The background of this thesis’ original cover illustration (Figure 1) is actually a real microscopic image of polymer-coated gold nanocrystals on a glass surface (Section 8.3.2.1) that was converted into a 3-



**Fig. 1:** Original cover of this thesis.

dimensional mesh using this script. The original scene is approximately 200 times smaller in width than a human hair.

I consider myself very lucky to have supervised a couple of highly talented students, that contributed practically to some of the experiments presented here: Stefan Ringe (double-anchor RAFT agent, Sections 5.2.1 and 7.1), Jannik Mechau (mono-functional silyl anchor, Sections 5.2.2 and 7.2), and Annika Nitschke (high-pressure cloud points, Chapter 6) worked in our lab in the framework of their bachelor theses. Steffen Eggers and Michael Hendrich (also high-pressure cloud points) did their practical lab course under my supervision. My special thanks go to all of them.

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I want to express my deepest gratitude to my fellow students Jakob Hey, Stefan Jackenkroll, Reent Michel, Adam Walli, and Arne Wolpers for their friendship.

Finally, I want to thank, with all of my heart, my family for unconditionally supporting me in any possible way and keeping me balanced. This includes my exceptionally understanding partner Sarah. The promise of our common future always motivated me on this exciting journey.

At this point, I would also like to give some general remarks on this thesis. It is generally subdivided into three main parts: An introductory part, where the most important theoretical concepts are reviewed, the experimental part, featuring a detailed description of the methods, and the major results part, in which the acquired data are presented and discussed. Additional information can be found in the appendices. Some more orientation guides are placed on the introductory page of each part and at the beginning of the chapters.

Although all figures were newly created for this thesis, some of them feature data which have already been presented in peer-reviewed publications which I (co)authored.<sup>[1–8]</sup> Any partial reproduction of these data is done with permission from the original publisher and indicated at the end of the figure’s caption.

I kept my research organized using the fantastic ORG-MODE<sup>[9,10]</sup> for EMACS<sup>[11]</sup> (founded by *Prof. Dr. Carsten Dominik*), which I highly recommend to everybody.

I truly hope some people will find the reading of this thesis helpful. Please do not hesitate to contact me if you have any comments or questions.

All the best to every reader of this text.

Göttingen/Lyon, 2014

Bastian Ebeling

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