Assembling nanocrystal superstructures

Marino, E.

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: https://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.


References


References


References


References


References


References


References


References


References


References


This thesis is based on the following publications:


List of publications

Cover feature:

Other publications by the author:


3. B. van Dam, Hui Nie, B. Ju, E. Marino, J.M.J. Paulusse, P. Schall,

As my PhD comes to a close, I look back to my failures and successes, and I feel the need to thank the many people who enriched my journey with their presence. I would like to thank my promotor and mentor, Prof. dr. Schall, for believing in me since the very beginning. Peter, I truly enjoyed the last four years. I was thrilled to be part of a multidisciplinary task force to tackle open questions of the nano realm. Despite the long days and full schedules, your door was always open for me. There were times when your support, advice, and encouragement were what really made the difference. Whenever I felt lost, your crystalline vision and talent have always set me back on course. Still, your supervision was always carefully balanced to allow me to grow and gain independence. Your passion for science has inspired me to be a better scientist and teacher, and I will always cherish your example.

This journey would not have been possible without the drive of my copromotors: Prof. dr. Gregorkiewicz and dr. Dohnalova Newell. Tom: Thank you for the contagious enthusiasm you put in your work. My fascination with nanocrystals sparked after attending your courses as an Erasmus exchange student. Sitting behind my classroom desk, I admired the passion you put into teaching. Nine months later, sitting behind my office desk, I admired the passion you put into research. Thank you for making me truly feel part of your group by inviting me to group meetings, Friday drinks, and to your beautiful home for Xmas dinners and summer barbecues. With your energy, you made your research group into a family that I am really glad to have been part of. Katerina: Thank you for all the interesting conversations we have had about science, art, and life. I have always valued your advice during the course of my PhD, and admired your straightforwardness that allowed me on multiple occasions to continue my journey with minimal delay. Thank you for your encouragement, for acknowledging and supporting my efforts. I wish you all success in your career, and happiness with your newly formed family. Although formally not my advisor, Prof. dr. G.H. Wegdam was an invaluable mentor during the course of my PhD. Gerard: Thank you for being truly an infinite source of knowledge and inspiration. In the last four years I have been looking up to you, your work, your dedication, passion, and experience resulting from a decorated career in science. Your input was key to interpreting many results, and I am amazed at how interested you still get - even after so
Acknowledgements

many years - when looking at brand-new data. I will miss your visits every Wednesday. Thank you for being a paradigm of good science, and for teaching me that a good project is never truly completed. I would also like to thank the rest of the committee of my PhD defense for doing me the honor of accepting my invitation and carefully reviewing my manuscript: Prof. dr. Murray, Prof. dr. Vanmaekelbergh, Prof. dr. Golden, Prof. dr. Sinke, and dr. Messina. Specifically, I would like to thank Prof. dr. Murray for the warm welcome to his group at the Department of Chemistry of the University of Pennsylvania, where I will serve as postdoctoral researcher.

The path to the PhD is - by definition - largely off the beaten track. The scientific and human support of coworkers helps staying in check with your life. The first person I would like to thank for this is dr. T.E. Kodger. Tom, during the last four and a half years, I often found myself wondering what would I write about you in my acknowledgments. How to put into words your never-ending support? You have been the most caring supervisor, the closest friend, and best man I could ever hope for. Thank you for teaching me to trust my observational skills above everything else, to be safe and confident in the lab, and to be unafraid of reaching out of my comfort zone. Thank you for teaching me to think outside the box, to take nothing for granted, and for giving me the unique perspective resulting from our different backgrounds. Thank you for pushing me to lay my own path. Above all, thank you for always listening. Your friendship is one of the greatest achievements of this PhD. I wish you all the best with your newly formed group in Wageningen - they are lucky to have you - and I am certain you will do great things in your career. I would also like to acknowledge dr. R.W. Crisp for being a huge supporter of my work. Ryan: Your friendship has been one of the cornerstones of my PhD. How crazy was meeting you at that summer school in Menorca, only to find out later that you would be working in Delft with Gianluca? It’s a small world. Your endorsement in the early stages of the project gave us the confidence we needed as a small group approaching nanoscience for the first time. Later, your advice, experience, and collaboration were key to finalizing many projects. Thank you for being a brilliant scientist, and a great friend. You deserve all the best things, and I have no doubt you will attain them. Another pillar of my PhD was dr. A. Capretti. Antonio: I still remember the day you first arrived for your interview. I was certain we would make a great team. Thank you for the invaluable scientific insights you have shared in our many conversations. When you speak, everyone in the room listens, and that is an extremely valuable skill to have in any professional environment. Good luck with your new professional adventure, but I know you will not need it. While I think I managed to make new friends, I have certainly not forgotten about old ones. Dr. F. Messina, Fabrizio: Thank you for being a great collaborator and friend. Thank you for introducing me to the world of ultrafast and for your fresh perspective on my projects. Your encouragement always meant a lot to me. Your constructive criticism forced me
more than once to take a step back and deconstruct a problem to its fundamentals, a
valuable skill for any scientist. I would also like to thank the rest of my collaborators
for being always helpful and for joining me for part of the journey: Alice and Marco
(Palermo), Daniel and Prof. dr. Loi (RUG), Jan Bart (WUR), Katherine and Marc (Jülich),
Federico, dr. Sychugov and Prof. dr. Linnros (KTH), Jenny, Marc, Annemarie, dr. Alarcon Llado,
and Prof. dr. Koenderink (Amolf). The help of technicians also cannot go unmentioned: Thank you Andries for teaching me about
electron microscopy, thank you Bob for helping me with photolithography, thank you
Paul for joining and bringing a bit of order to the group.

A huge thank you also goes to my parynmphs, Arnon and Gianluca. Arnon: Thank you for being a true friend. I enjoyed spending
time with you eating good food around the city, drinking beers on the porch at sunset, drinking lots of coffee
during breaks, playing basketball, ice skating, and swimming. I enjoyed each of our conversations, and I admire just how mellow, wise, and zen you are at times. I only wish we worked more together, but I think we learned a lot from each other regardless.

I have a feeling that I will find you in ten years living in a cozy cabin in the woods, that
you built yourself, enjoying the beauty of Nature. If so, please do not forget to add a
guest room. Gianluca: Ever since we first met in the first year of Bachelor in Palermo,
about 9 years ago, I admired you for your brilliant and composed intelligence. I am
glad you ended up moving to the Netherlands and we got to spend more time together.

Thank you for your support with the interpretation of ultrafast data, I learnt so much
from our conversations. Thank you for all the good times we had, for the laughter, the
beer, and the memories. I have no answers for your future - but I think you do. In
any case you wont need any, because wherever you will go you are going to make the
difference. I have no doubt.

I would also like to thank everyone at the van der Waals - Zeeman Institute of
Physics of the University of Amsterdam who contributed to creating a fruitful and
friendly work environment. Thank you Chris for being such a positive person, and for
sharing with me that magical last afternoon with your horses. Bart, measuring with
you at the beginning of my PhD was fun. Also, I will never forget that time we raced
on the dyke with our bikes, and you beat me nonchalantly while eating your sandwich.

Ah! Fun times. Thank you for being one of a kind. Chia-ching, you have big shoes
to fill but I think you will be doing just fine. Thank you for all the laughter and fun
stories you shared. Rens, you are such an achiever in everything you do, you make it look so easy! Thank you for being such a nice guy and a source of motivation. I
have no doubt I will see great things from your career. Elinore and Marco: Thank you
for being positive and tenacious people, the world needs more like you. Leyre, thank
you for bringing some chemistry to the TGG, I think they really needed it. Good luck
with your applications, I am certain you will find something you like. Berend: I want you to know that every page of this thesis was written with the hope that one day you could read it. Good luck man, I believe in you! Now the Soft Matter Group. Simon, my man. I wish we spent more time together. It’s mostly my fault, sorry. Good luck with finishing up, you will do just fine. Mohsin: Thank you for teaching me about Kashmir and its traditions, and for the many dinners. You have a true talent as a chef, I really mean it. I hope your dreams come true. Joep, you are such a nice guy, you should not hide in the lab all the time! Joking. Best of luck! Martin: You joined us only recently (oh my god has it been more than one year already?) but it did not take me long to figure out how great you are. Thank you for being such a fun guy, I am sorry we did not have the time to visit you in Liege, but never say never. Good luck to you and your beautiful wife! Antoine, or Monsieur Marie Curie. Congratulations on winning the grant, you deserved it. Keep up the good work, I am curious to see where you will end up! Bijoy, thank you for your friendship inside and outside the lab. May our love for sushi never die. A special place in my heart goes to the master students I helped supervise. Milo, you have so much potential, I hope you soon find a suitable channel where to direct your energy. Don’t give up, keep looking! Melvin, I had no doubt you would quickly get set up in the professional world, congratulations on your new job and I hope some of the principles we learnt together will be able to help you even outside academia. Bas, you took on a very difficult project, and you managed to bring it to completion thanks to your hard work and tenacity. You should be proud of yourself, and I am certainly proud of you. I think we made a good team, and I hope the scientific method will keep guiding you in your career. I also would like to thank other past members of the group. Laura, congratulations on becoming a PI and a mom in the same year! I had so much fun with you, thank you for always being there to chat about anything, from science to diamond rings. Dolf, good luck with your new position in Osaka! Henri, thank you for the amazing time we had in Berck, I hope to visit again one day! Of course, none of this would have been possible without the constant help and logistic support of the Institute manager, Joost, and secretaries who helped so much with all sorts of practical matters: Rita, Anne-Marieke, Astrid, Jirina, and Claartje. Thank you for making my job easier every day.

I enjoyed immensely life in Amsterdam also thanks to all my friends. Paolo, thank you for putting together the amazing Bozzellions group, for the many dinners, barbecues, drinks, birthdays, concerts, nights out, King’s days and nights you have organized. You have been and always will be in our hearts. Good luck with your career in Italy. I am equally grateful for the amazing friendships with Gaspare, Giuseppe and Joana (your wedding was amazing, congrats!!), Ivano, Marco, Salvo and Bianca (so proud of you guys, can’t wait to meet little Taninuzzo), Simone, Daphne, and my bro Mattia, Justine, Sarah, Jennifer, and Carmine. But my life in Amsterdam really
started on the right foot thanks to my Uilenstede flatmates of the tenth floor, also known as *the greeks*. I don’t think of you guys as friends but rather as my family in Amsterdam. Caye, I am so proud of you and of what you managed to achieve so far. Keep up the good work, I am certain your PhD will give you many satisfactions. Dimi, congratulations with your new job! Thank you for being the heart of this group. I wish you happiness and I am certain you will find your way. Dila, you are probably the person who evolved the most in the last five years. Congratulations on the Inburgering, on your new apartment (sorry for not having the time to visit), and on your new job! So much change. I am so proud of you for fighting adversities even when it seemed like there was nothing you could do: You proved everyone wrong and that is what life is about. Thank you for being an amazing person and friend. Eider, where should I start. What a fantastic friend you have been! Thank you for always being there for me and for being such a wonderful person. I am fascinated by the clash of your southern nature with your incredibly scientific mind. I think you will achieve great things in life, and I am curious to see where you will end up in ten years. I am certain we will still be friends, and that is a very reassuring thought. Peri, hanging out with you was so much fun. I hope your business venture succeeds, and that one day we can all reunite on a white greek island to reminisce about the good times in Amsterdam. Furthermore, I must acknowledge the love and support of a few more special friends. Ale, thank you for welcoming me when I first moved to Amsterdam, and for being such a good friend inside as well as outside class. I enjoyed working with you, and I only wish we got to spend more time together. You are one of the friendliest guys I know, everyone who knows you loves you, and it is something really magical to witness. I really hope we manage to stay in contact and that one day we will visit each other in Puglia and Sicily. Silvia, thank you for being my best woman at my wedding and one of my closest friends. I feel like our friendship started by chance, but eventually developed in something truly special. Thank you for all the awkward situations you manage to put me in, it is fun to talk about them once the cringe has worn off. I think your greatest gift is being the fulcrum that allows people to connect, giving them a chance to resonate with each other. Last but not least, Peppe and Manu, my friends of a lifetime. Even though we do not hang out as much anymore, I am still grateful for your daily support. Thank you for all these years of friendship, and for all those that will follow.

This thesis is dedicated to my family, and rightfully so. I owe everything I am to the constant love, care, and support my parents, my brother, and my sister have given me. I need to specifically thank my mother for her patience on the countless times she has sat with me, as a child, to help with my homework, and as an adult, lending her ear to me preparing for many oral exams at the university. It is thanks to you if I have made it this far. I also need to acknowledge my Irish family, Sharon, Frank, Reideen,
Acknowledgements

Gillian, Niamh, Lilly, Joe and Brida for teaching me that even a traditional concept like family can be revisited and extended. Thank you for accepting me in your life, you will always hold a special place in my heart. I would also like to thank my in-laws, Raimundas, Zita, and Romante, Lukas, Miglė, Paitikas, and Vilne, for making me feel at home during my visits and for the goodness of their hearts.

Finally, I would like to thank my wife, Eglė, for her unconditional love, support, and patience throughout this journey. Thank you for being the love of my life, my best friend, my confidant, my student, and my teacher. I am looking forward to a life of happiness together.

Thank you for reading,

Emanuele Marino