Defect ferromagnetism in ZnO and SnO2 induced by non-magnetic dopants

Akbar, Sadaf

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2017

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):

Copyright
Other than for strictly personal use, 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), unless the work is under an open content license (like Creative Commons).

Take-down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): http://www.rug.nl/research/portal. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Download date: 13-06-2020
Acknowledgment

It fills me with immense pleasure to be able to express my gratitude. Yet, it is difficult to express my gratitude completely and I make a humble attempt while fighting a mixture of emotions. Foremost, I would like to express my gratitude to my supervisors, Prof. Petra Rudolf and Prof. Khurshid Hasanain. I stand in admiration of you both; for all that you have done to see this thesis through to a completion.

Prof. Petra, this thesis could not have been accomplished without your great support. It’s your trust and confidence on me, which lead to completion of this thesis. I appreciate the degree of creative freedom within the group, where I was able to develop my project. Also provide me the opportunity to work with other groups. Furthermore, it was Prof. Petra who gave me the opportunities to attend scientific activities abroad, thereby allowing me to present my work to the international community. I must say Prof. Petra is not only a great scientist but also marvellous person.

I am very thankful to members of the thesis reading committee Prof. F. Parmigiani, Prof. B. Noheda and Prof. M.S. R. Rao for approving the manuscript and for your comments on the contents of the chapters.

I gratefully acknowledge Prof. Thomas Palstra for the valuable discussions and the use of his group lab facilities, especially the SQUID of the Solid State and Materials for Electronics (SSME). I express my sincere gratitude to Dr. Graeme Blake for assisting me in understanding and retiveveld refinement of the crystal structure of nanoparticles. Special thanks for Jacob Baas for unconditional and moral support in measurements and also Dutch translation of my abstract. I am glad that we had worked together.

I am thankful to Prof. M. A. Loi for optical characterisation of nanoparticles in his group Photophysics and Optoelectronics. I had great time with you in one of Goslar meeting “From the witches cauldrons in materials science”. I thank you W. Gomulya for help in measurements.

For morphological study of nanoparticles and thin films, I am grateful to Prof. J. Th. M. De Hosson, allowed me to work in his group and M.V. Dutka for helping with TEM and SEM measurement.
Acknowledgment

I thank you Prof. S. Ismat Shah for the successful collaboration of my starting Ph.D project of thin films, especial thanks for XPS characterisation performed at University of Delaware, USA. Dear Dr. Shah I am grateful to you for your always welcoming attitude. On a more personal level, the Nathiagali conferences were the memorable time I share with you. I thank you B. Ali, Abdual Ramiz and G. Jaffrii for XPS measurements and all required discussions. I thank you Prof. S. Ozcan(Hacettepe University Beytepe Ankara) for magnetic measurements of thin films. I am greatly indebted to dr. Gul Rehman for sharing his immense knowledge and introducing me to the new direction of work(SnO$_2$) following his computational work. You have been particularly motivating in many instances. I am glad we had extensive discussions on the topic. I express a tremendous amount of respect to Manzer Abbas, it was a great pleasure to start my PhD work with you at PCRET. You introduced me to the evaporation techniques, electron beam chamber, heat resistive methods and solar cell preparation. I enjoyed doing the experiments together and chatting about various topics in between the measurements.

I express my sincere gratitude to Dr. Meike Stöhr and all colleagues of “Surfaces and Thin films” group. I am especially grateful to Naureen Akhtar and Olekssii Ivashenko for their help and guidance. I feel really lucky to have had Oleksii around who help me with XPS and Raman measurements. I also would like to thank Luca, Martina, Mihaela, Tashfeen, Stefano, Peter, Kathrin, Ali and Anh for the nice time we spent in Lab. I am grateful to Yvonne for help in administrative work. I acknowledge J. Noteboom for translating the summary of this thesis. Special thanks to Jiquan Wu for taking the responsibility of paranymph. I found Jiquan not only a nice colleague but also an honest person. Thank you for arranging trip to Keukenhof, I enjoyed a lot with you and your other Chines friends.

Many thanks to Aisha, Saeedeh, Goe Li, and all other members of SSME for being so co-operative. I thank you Maria and Safdar for support and care, I wish both of you good progress with your PhD and bright future.

I am also thankful to my Lab fellows of magnetism group(Pakistan) Aftab, Saif, Naveed-ul-Haq, Asad, Tayyaba, Motia, Alina, Ali Imran, Fareeha Batool, and Foqia for the moral support and for creating a comfortable working environment. I would like to express my deepest gratitude to my research colleague Shahzad Hussain, and Muhammad Usman for their support.
Umber, Madiha, and Munazam thank you for your support and care. I thanks to all my hostel fellows Samina, Bushra, Laila, Nigum, Rabia, and Humera for being there and I am thankful for your cheerful presence in my life.

I thank you Prof. Zhiming Wang for inviting me as speaker at EMN conference (Amsterdam) and your hospitality in UESTC during my stay at China. I thank you Prof. Arup (University of North taxes) for being generous and all moral support.

Last but not least, Thanks to my family, my father (late) and mother who listened to every tiny detail that I had to tell them about my work and they always encouraged me. Dear Father, I wish every daughter have father like you I still remember your saying for me “You are a papa’s girl” and “keep on dreaming”. It’s all your endless efforts to see me get succeeded and continue my carrier as female researcher. I am also thankful to my sister Tanzeela Chaudrhy for her constant moral support and maintaining my stay at her home (Belgium). She always give me great confidence and make me feel as if I am able to accomplish anything in the world that I want. Special thanks to my nieces Uzma, Jannat and Fatima for making this world colorful with their naughty acts. I am thankful to my brother and her wife for all support and help.

January 2017
Groningen
Sadaf Akbar