List of Figures

List of Tables

Acknowledgements

I would like to extend my sincere thanks to the many that have helped me to reach this point. To my adviser, Prof. Donghai Wang, who trusted me to be one of his first students, for his unflagging support and for all that he has taught me. To Prof. Chao-Yang Wang, Prof. Hosam Fathy, and Prof. Sulin Zhang, for graciously serving on my committee. To the other members of my lab, past and present, for the hard work, new ideas, and camaraderie we have shared, and for the many things I have learned from them. To my other collaborators both inside and outside of Penn State, for the exciting work we have done together. To the staff of Penn State's Materials Characterization Lab, for their incredible help in turning my work from ideas into results, and helping me learn how to do so myself. To Philip Irwin, for masterfully building tools which enabled a large chunk of the research herein. It has been a great pleasure and an amazing learning experience to together shape our contributions to science and technology.

My deep thanks to my family and friends for all their kindness, patience, and support. Without them, I would have been in no state to complete any work at all.

Finally, I would like to express my thanks to the United States Department of Energy and to the Ben Franklin Technology Partners of Pennsylvania for their funding and support, without which my work and that of many others could not have been realized.