

Acknowledgements

I would like to express my sincere gratitude to my advisor, Professor Ahmed H. Zewail, for his attentive guidance during this work. Without his scientific vision and insight, his passion to push the frontier of science, and his generous support, this work would not have been possible.

I have been very fortunate to work with many talented postdoctoral fellows and graduate students. I thank all of them: Dr. Franco Vigliotti, Dr. Vladimir A. Lobastov, Dr. Chong-Yu Ruan, Dr. Marco T. Seidel, Dr. Nuh Gedik, Dr. Peter Baum, and Jerry (Ding-shyue) Yang.

Other members in Professor Zewail's group have given me much help over the years, especially these people in UED3: Dr. Boyd Goodson, Dr. Ramesh Srinivasan, Dr. Jonathan S. Feenstra and Dr. Sang Tae Park; and two theorists: Dr. Scott Habershon and Dr. Jau Tang.

I would also like to acknowledge Professor Nathan S. Lewis and Dr. Lauren Webb for help in preparing the silicon surfaces; Professor James R. Heath for the use of his Langmuir-Blodgett film preparation facilities, Peigeng Cao, Dr. Yi Luo, and Dr. Hongbin Yu for advice and discussion on Langmuir-Blodgett films.

This work was supported by the National Science Foundation and the Air Force Office of Scientific Research. I thank the Robert A. Millikan Fellowship for the financial support in the first three years of my graduate work.

Last but not least, I thank my family for giving me all their love and support.