

ACKNOWLEDGEMENTS

My thesis could not have been completed without the assistance and support from several people, to whom I would like to convey my sincere gratitude.

Firstly, I would like to express my profound gratitude to Prof. Dr. Rattikorn Yimnirun, my big boss and chairman of my thesis defense committee, for his valuable support, advice, very gentle patience and guidance in every steps. Moreover, not only his scientific support, but also his great perspective and trust were a great help and motivation throughout my study life.

I thank Assoc. Prof. Dr. Prayoon Songsiririthigul, my thesis advisor at Suranaree University of Technology. He gives really valuable perspectives, advice, suggestions, and support for my graduation.

I would like to also thank Assoc. Prof. Dr. Saroj Rujirawat for supporting and suggesting me in scientific aspects and for accepting me to be a member of his group.

I would like to express my grateful to Dr. Narong Chanlek for his valuable assistance, push and pull motivation and suggestion in this research work.

I am also grateful to Dr. Mati Horprathum at NECTEC for the professional supports and suggestion in this research.

I thank all staff at Beamline 3.2 and Beamline 5.3, Synchrotron Light Research Institute (SLRI), everybody in our characterization group, school of physics, Suranaree University of Technology (SUT).

Special thanks to Miss Jenjira Tanamai for her love and encouragement.

It is impossible to name all who was a great help during my Ph.D. study, for the wonderful times we shared.

Finally, I would like to express appreciation to my family, my parents and my older brothers for their love and everything in my life.

Ekachai Chongsereechoen