ACKNOWLEDGEMENTS

I would like to acknowledge the all supported by Center of Excellence on Alternative Energy (CEAE), Research and Development Institute (RDI), Sakon Nakhon Rajabhat University (SNRU). I am heartily thankful to my advisor, Associate Professor Dr. Tosawat Seetawan, whose encouragement, guidance and support from level enabled me to develop an understanding of the subject.

I would also express high gratitude toward the National Electronics and Computer Technology Center (NECTEC) under Dr. Mati Horprathum and National Metal and Materials Technology Center (MTEC) under Dr. Chanchana Thanachayanont for the characterization equipment.

I would like to thank staff member of CEAE, master and Ph.D. students of Program of Physics, Faculty of Science and Technology, SNRU for helpful everything and finally my family to support spiritual for me forever.

Kunchit Singsoog

- ~pult's