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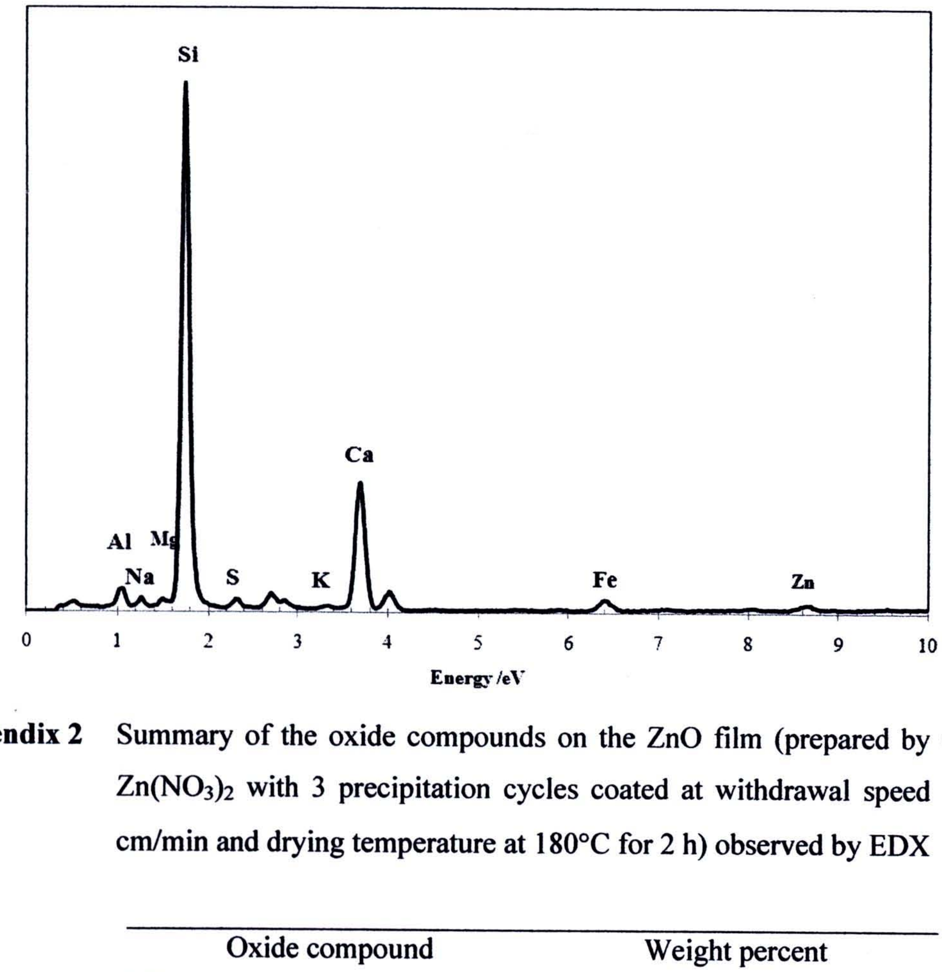
APPENDIX

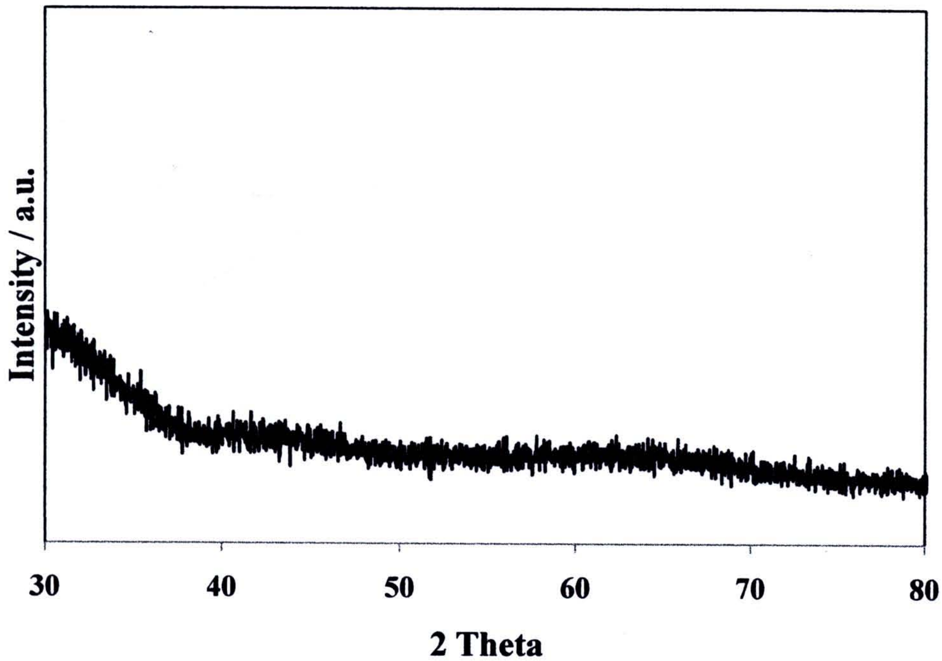
Appendix 1 EDX analysis of ZnO film prepared by 0.1 M $Zn(NO_3)_2$ with 3 precipitation cycles coated at withdrawal speed of 3.0 cm/min and drying temperature of 180°C for 2 h



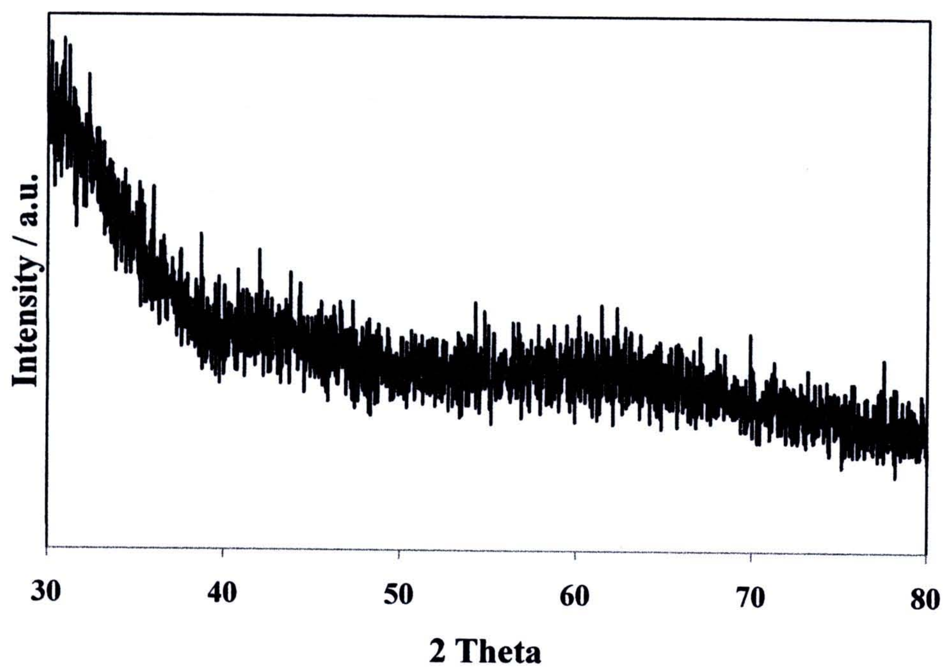
Appendix 2 Summary of the oxide compounds on the ZnO film (prepared by 0.1 M $Zn(NO_3)_2$ with 3 precipitation cycles coated at withdrawal speed of 3.0 cm/min and drying temperature at 180°C for 2 h) observed by EDX

Oxide compound	Weight percent
SiO_2	71.21
SO_3	0.80
K_2O	0.20
CaO	7.11
Na_2O	14.84
MgO	2.28
ZnO	0.02

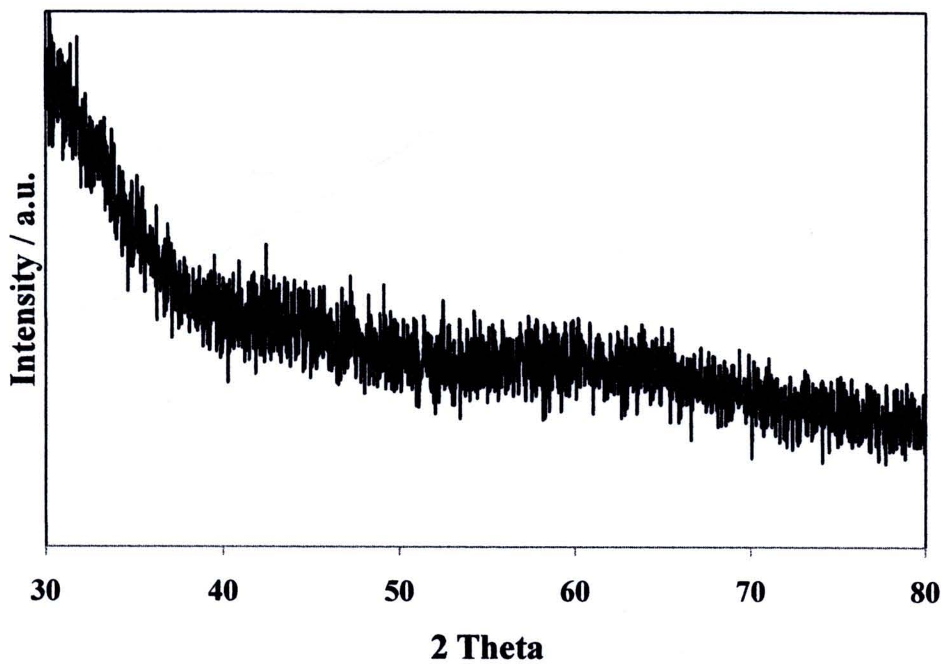
Appendix 3 X-ray diffractograms of ZnO incorporated with polyelectrolyte film prepared by precipitation method with 3 precipitation cycles and drying temperature of 180°C



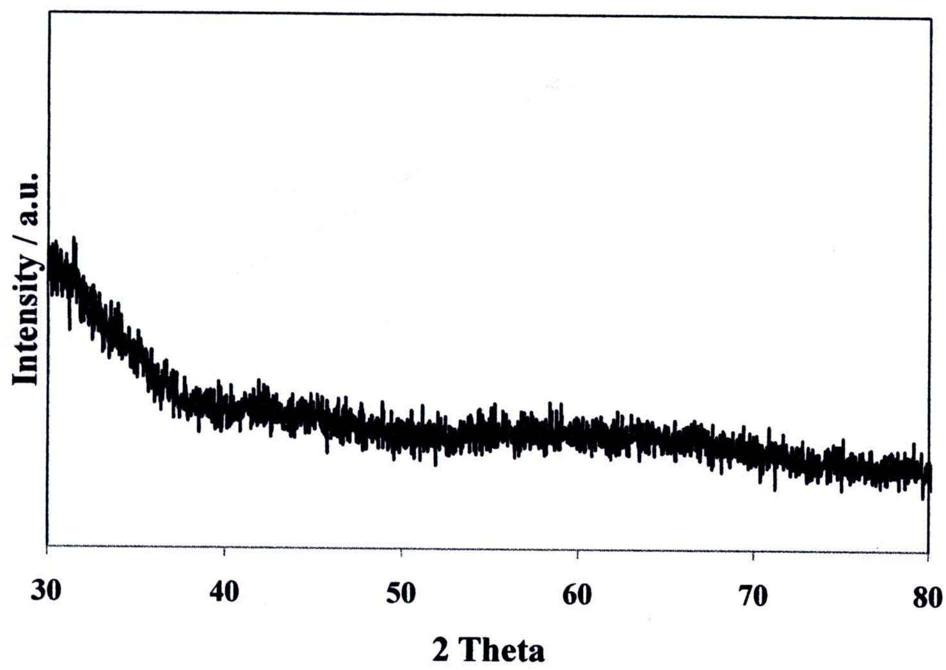
Appendix 4 X-ray diffractograms of ZnO incorporated with polyelectrolyte film prepared by 0.1 wt% ZnO in poly(acrylic acid) (PAA) solution with drying temperature of 180°C



Appendix 5 X-ray diffractograms of ZnO incorporated with polyelectrolyte film prepared by 0.2 wt% ZnO in poly(acrylic acid) (PAA) solution with drying temperature of 180°C



Appendix 6 X-ray diffractograms of ZnO incorporated with polyelectrolyte film prepared by sol-gel method as prepared by pH of precursor sol of 1 with calcination temperature of 500°C



VITA

Miss Walaiporn Suthabanditpong was born on April 23, 1984 in Bangkok, Thailand. She graduated from a secondary school of Mahidolwittayanusorn School in 2001. In 2006, she received a Bachelor degree in Chemical Engineering from King Mongkut's University of Technology Thonburi and continued her study in Chemical Engineering for the Master degree at the Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University. During the master program, she conducted a research entitled "Deposition of nano-scaled zinc oxide on polyelectrolyte film by layer-by-layer technique" under supervision of Assoc. Prof. Tawatchai Charinpanitkul, the head of Center of Excellence in Particle Technology (CEPT). As a part of her master program, she received financial support from Japan Student Service Oganization (JASSO, Japan) to work as a research student at Nagoya Institute of Technology (NIT, Japan) for 10 months. She received the Master degree of Chemical Engineering in 2010.

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