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APPENDICES

APPENDIX A

LIST OF ABBREVIATIONS

AM	Air mass (for solar spectral irradiation)
AR	Anti-reflection (coating)
a-Si	Amorphous silicon
CBD	Chemical bath deposition
CRT	Cathode ray tube
CIGS	Copper-indium-gallium-diselenide
CIS	Copper-indium-diselenide
CGS	Copper-gallium-diselenide
CURO	Cu-Rich-Off
CUPRO	Cu-Poor-Rich-Off
DC	Direct current
EDS	Energy dispersive x-ray spectroscopy
EPD	End point detection
FWHM	Full width at half maximum
In _{Cu}	Indium on copper anti-site defect
MBE	Molecular beam epitaxy
NDC	Neutral defect complex
OP	Output power (of the temperature controller)
OVC	Ordered vacancy compound
PV	Photovoltaic
PVD	Physical vapor deposition
PBN	Pyrolytic boron nitride

PID	Proportional integral derivative
QCM	Quartz crystal monitor
QE	Quantum efficiency
RF	Radio frequency (for sputter process)
R	Reflectivity
SEM	Scanning electron microscopy
SLV	Solid-liquid-vapor
T	Transmissivity
TC	Thermocouple
TCO	Transparent conducting oxide
TEM	Transmission electron microscopy
T_{sub}	Substrate temperature
T_{gh}	Graphite heater temperature
T_{pyro}	CIGS surface temperature (measured by pyrometer)
V_{Cu}	Copper vacancy defect
XRD	X-ray diffraction
Δm	Molecularity deviation
Δs	Stoichiometry deviation
ε	Emissivity
η	Photovoltaic conversion efficiency

APPENDIX B

LIST OF PUBLICATIONS

1. J. Kessler, C. Chityuttakan, J. Schöldstrom, and L. Stolt, "Growth of Cu(In,Ga)Se₂ films using a Cu-Poor/Rich/Poor sequence: substrate temperature effects", Thin Solid Films, Vol. **431-432** (2003): 1-5.
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3. C. Chityuttakan, P. Chinvetkitvanich, K. Yoodee, and S. Chatraphorn, "*in situ* Monitoring of the Growth of Cu(In,Ga)Se₂ Thin Films", 14th International Photovoltaic Science and Engineering Conference (**PVSEC-14**): 2004, Bangkok, Thailand : 523-524.
4. C. Chityuttakan, P. Chinvetkitvanich, K. Yoodee, and S. Chatraphorn, "*in situ* Monitoring of the Growth of Cu(In,Ga)Se₂ Thin Films", accepted for publication in Solar Energy Materials and Solar Cells.

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