CHAPTER I

INTRODUCTION

This study intends to focus on the possibility to replace or substitute the commercial in-line Transparent Conductive Oxide (TCO) glass using as the superstrate of the glass-to-glass a-Si thin-film photovoltaic (PV) modules with lower cost in-house manufactured TCO glass coated by Indium Tin Oxide, In_2O_3:Sn (ITO) which in this study will be referred to as "In-house TCO glass".

TCO glass plays the important role and shares large portion (approx. 54 percent) of the total direct material cost of the glass-to-glass a-Si thin-film silicon PV modules [1]. The commercial in-line TCO glass coated with Fluorine Tin Oxide, SnO_2:F (FTO) used today in the a-Si thin-film silicon PV modules are only available commercially from a few large float-glass sheet manufacturers at rather high cost with supply uncertainty.

Manufacturing of In-house TCO glass coated with ITO layer by the sputtering method in the existing a-Si thin-film PV module factory will therefore be concentrated in this study.

Rational of the Study

To reduce the cost of the a-Si PV modules by replacing expensive commercial in-line TCO glasses with lower cost In-house TCO glass using new and simpler ITO layer sputter coating technique.

Statement of Problem

Limited number of commercial in-line TCO glass manufacturers and sharp increase in demand of thin-film silicon solar PV modules render negative affects to the industry i.e.

1. Higher cost of commercial TCO glass
2. Supply limitation and uncertainty
3. Less flexibility on the specification

Objectives of the Study

To produce lower cost In-house TCO glass which posses the same technical specification as the commercial TCO glass currently using in a-Si PV module. This will be the first time in the industry that TCO glass with ITO layer is used in solar PV application.

Scopes of the Study

1. Perform production cost calculation on In-house TCO glass.
2. Produce In-house TCO glasses coated with ITO layer in the glass coating line using sputtering method.
3. Collect the measured data (Sheet resistance, uniformity and light transmittance) of the In-house TCO glass samples manufactured.

All data to be collected at Bangkok Solar Co., Ltd., Thailand during commissioning and production tests.

Methodology

Analyze production cost In-house TCO glass and from the commissioning and production tests, measure sheet resistance and optical transmission of sampling In-house TCO glasses.

Expected Benefits

In-house TCO glass coated with ITO layer renders the compatible quality, technical specifications and has lower cost than the commercial in-line TCO glass. It can be also used to substitute or replace commercial TCO glass and help reducing the production cost of a-Si PV module.

The final result of this study can be a new milestone and turn-around point of the a-Si thin-film PV module manufacturing industry. In-house TCO glass coated with ITO layer will be first time used for producing a-Si PV modules.