

CHAPTER II PROPERTIES OF CONTACTS

CHAPTER II PROPERTIES OF CONTACTS BETWEEN HYDROGENATED AMORPHOUS SILICON AND OTHER MATERIALS

2-1. Introduction

Studies of metal/semiconductor junctions and heterojunctions are helpful for understanding fundamental device physics as well as for realizing applications to various devices. In other words, it is necessary to recognize whether each contact in a device shows Ohmic behavior or rectifying behavior.

This thesis has investigated the electrical properties of a rectifying junction between an undoped hydrogenated amorphous silicon-based alloy and crystalline silicon (c-Si) in a metal/amorphous/crystalline diode. So, it is necessary to make only one rectifying heterojunction and the other good Ohmic contacts in the diode. In order to get Ohmic contacts with undoped hydrogenated amorphous silicon-based alloys, however, the use of heavily doped hydrogenated amorphous silicon (a-Si:H) should be avoided because of keeping the dopant of heavily doped a-Si:H from contaminating the undoped hydrogenated amorphous silicon-based alloy. This is because the properties of undoped hydrogenated amorphous silicon-based alloys have been investigated by the study of those heterojunctions. Therefore, metal is preferable to an Ohmic-contact material for undoped hydrogenated amorphous silicon-based alloys as long as metal is evaporated onto amorphous films at room temperature.

This chapter has investigated electrical properties of metal(Au,Pt,Al,Mg)/a-Si:H/c-Si(n^+ , p^+) diodes and has described the property (Ohmic or rectifying) of each contact. Furthermore, the conduction type of P-doped, undoped, and B-doped a-Si:H has been classified into three categories such as n-type, intrinsic, and p-type from the study of junction properties.

2-2. Contact Properties for Undoped and P-doped a-Si:H