1. Introduction

**Advantage of Organic Device**
- Flexible
- Light weight
- Low cost
- Low temperature process

**Objective**
The Realization of Pentacene-Based CMOS with N-Doped LaB₆ Interfacial Layer

**Contents**
- The effect of N-doped LaB₆ interfacial layer for Pentacene film
- N-type characteristics in the air

**Organic CMOS:** Generally 2 organic semiconductors

**Conventional Organic Materials-Based CMOS**

**Single Organic Material-Based CMOS**

2. Experimental Procedure

**Evaporation Chamber for Pentacene**

**N-OFET with Ca Donor Layer**

**Low Work Function Materials**

- Work function: 2.4 eV
- Good oxidation immunity by N doping of 6.6 at.

3. Effect of N-doped LaB₆ Interfacial Layer

**Surface Morphology of Pentacene Film**

**AFM Image of Pentacene Film**

**XRD Pattern of Pentacene Film**

- Grain size was dramatically increased on N-doped LaB₆.
- Grain size was increased with increasing temperature.
- Larger grain than 10 μm without lamellar grain at 100°C deposition

**High quality Pentacene film can be formed on N-doped LaB₆**

4. N-Type Characteristics of Pentacene-Based OFET

**MOS Diode Characteristics**

- Accumulation in positive bias was obtained.
- J-V characteristic also showed n-type characteristic.

**Electron current was obtained in the air with light by using N-doped LaB₆ film**

5. Conclusion

In this paper, N-doped LaB₆ with low work function of 2.4 eV and good oxidation immunity was investigated for Pentacene-based device. It was found as below.

- Deposition on N-doped LaB₆ at 100°C
  - Pentacene grain size: larger than 10 μm
  - The lamellar grain can be suppressed
- MOS diode with N-doped LaB₆ layer
  - C-V and J-V showed n-type.
- OFET with N-doped LaB₆ interfacial layer
  - Electron current was observed in the air.
  - It is still necessary to be assisted by light exposure.
  - The extracted electron mobility was 6.5x10⁻⁷ cm²/(Vs).

For the future step, the effect of N-doped LaB₆ interfacial layer in p-type Pentacene-based OFET and the passivation layer for Pentacene film in n-type OFET will be investigated. In addition, Pentacene-based CMOS with N-doped LaB₆ interfacial layer will be fabricated.

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