

PHOTO-RESPONSIVE NAPHTHALENEDIIMIDE DERIVATIVE CARRYING A NITROXIDE AND AN AZOBENZENE GROUP

Miki NAKAGAWA¹, Hiroki AKUTSU¹, Jun-ichi YAMADA¹, Makoto KARAKAWA², Yoshio ASO², and Shin'ichi NAKATSUJI*¹

Abstract. *A couple of naphthalenediimide derivatives carrying a nitroxide radical and an azobenzene group (4 and 5) were prepared as potentially photo-responsive radical compounds. While no clear photochromism could be discerned for 4 with p-amino-substituent, apparent photochromic property has been observed for 5 with p-dimethylamino-substituent by illumination in solution. N-type FET characteristics were observed for both of them even if their carrier mobilities were fairly small and the apparent changes of the characteristics were disclosed by photo-irradiation with UV light as well as successive heating for 5 at the thin film condition.*

Key words: *nitroxide, azobenzene, FET, photochromism, magnetic property*

Introduction

There is a growing interest in the search for effective organic semi-conducting materials for field effect transistors (OFET materials) because they are expected to be promising components in future electronics due to their possible applications such as integrated circuits for flexible electronics (Klauk H., 2006; Petty M. C., 2007; Wöll C., 2009). OFET materials with high-mobilities have so far been mainly p-type transistors and some of them show their device performances being comparable to those of amorphous silicon (Halik M. et al., 2003; Payne M. M. et al., 2005; Briseno A. L. et al., 2006; Yamamoto T. et al., 2007). On the other hand, the combination of p- and n-channel FETs is required especially for applications such as complementary circuits and hence the concurrent development of organic n-type FETs is desirable. In this context, considerable efforts have also been undertaken in the development of organic n-type FET materials (Chua L. L. et al., 2005; Facchetti A., 2007), e.g., fluorinated oligothiophenes, methallophathrocyanines, hetero-tetracyanoquinodimethanes, dicyanopyrazinoquinoxalines, or anthraquinones. Among them naphthalenediimide (NDI) derivatives (Katz H. E. et al., 2000; Kao C. C. et al., 2007) and perylenediimide (PDI) ones (Jones B. A. et al., 2004; Chen H. Z. et al.,

*¹ Graduate School of Material Science, University of Hyogo, 3-2-1 Kouto, Kamigori, Hyogo 678-1297, Japan, e-mail: nakatsuji@sci.u-hyogo.ac.jp;

² Institute of Scientific and Industrial Research, Osaka University, Ibaraki, Osaka 567-0047, Japan