

Photosensitive Systems Involving Photoconduction and Photochromism

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The photoreversible color changes (photochromism) of spirans are well known. The spectral sensitizing effect of the colored species of spirans upon the photoconduction of zinc oxide has also been observed.¹⁾

In this paper, we will discuss some photosensitive systems which show both photochromism and spectral sensitization for photoconduction.

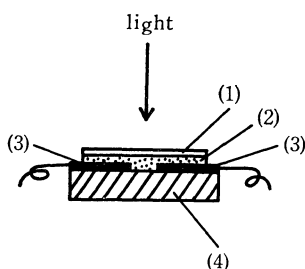


Fig. 1. Experimental arrangement for sp 3 zinc oxide bilayer.

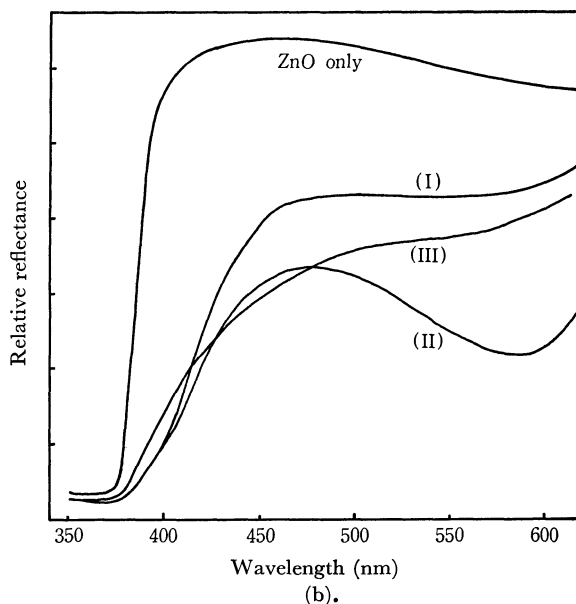
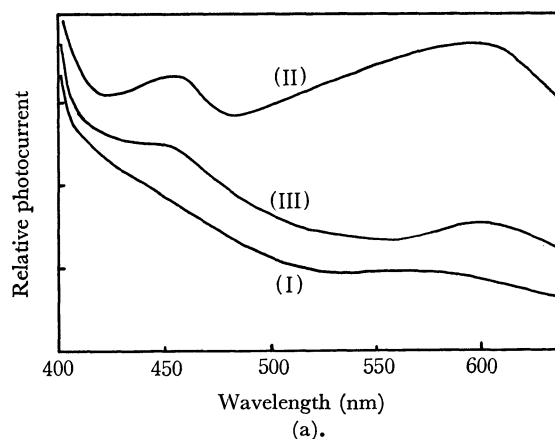
(1) sp 3 evaporated film, (2) zinc oxide powder layer
(3) chromium electrode, (4) glass base

The photosensitive element was formed as is shown in Fig. 1. The photoconductive layer (Fig. 1-(2)) was coated with ZnO powder (0.3 $\mu\phi$)-alcoholic paste on a glass substratum with a pair of Cr-electrodes. After the solvent had been dried from the layer, a photochromic layer (Fig. 1-(1)) was settled upon the layer (Fig. 1-(2)) by the vacuum evaporation of spiran (1,3,3-trimethylspiro[5-chlor-indoline-2,2'-(6'-nitro)benzopyran]).

The photoconductive response of the element was hardly observed in the visible light region, its color was faint yellowish white. An intense color appeared when the element was irradiated with ultraviolet light (365 nm).

The photoconductive response of the photo-colored element was also observed in the visible light region. The spectrum of the photoconduction corresponded to the absorption spectrum of the UV-light-photo-generated colored species of spiran (Curves II and III of Fig. 2). The photocurrent and reflection spectral curves of the element after irradiation with UV light are shown in Fig. 2.

The color of the element was bleached by irradiation with visible light. The photo-bleached element did not show any photocurrent in the visible region. The change between the coloration accompanying spec-



(I) in the dark
(II) after UV light irradiation
(III) same as II after visible light bleaching

Fig. 2. The photocurrent (a) and reflection (b) spectral curves of the element.

trally-sensitized photoconduction by UV irradiation and the bleaching of the color by visible light irradiation was repeated several times.

This kind of photochromic and photoconductive element are promising for use with memorized imaging systems.

1) E. Inoue, T. Nakayama, and H. Kokado, *Kogyo Kagaku Zasshi*, **72**, 2352 (1969).