OPTICAL PROPERTIES OF POROUS SILICON DOPED WITH ERBIUM

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ABSTRACT

OPTICAL PROPERTIES OF POROUS SILICON DOPED WITH ERBIUM

The effects of immersion time and quantity of Erbium plated on porous silicon (PSi) have been studied. Porous silicon was prepared by electrochemical method with an electrolyte composed of Hydrofluoric acid and Ethanol. The Erbium plating process was carried out by immersion technique with electrolyte composed of Erbium (III) nitrate pentahydrate and Ethanol. The photoluminescence (PL) effect on PSi samples have been studied and shows a PL intensity is improves at certain mass percentage of Erbium (Er) and the PL peak shifts to the blue luminescence. Fourier Transform Infrared Spectroscopy (FTIR) was also performed to study the chemical functional group changes after the plating process. The possible mechanism of the effects will be discussed in this paper.

The result shows that when the Erbium diffuses into a pore, an enhancement of the photoluminescence was obtained for all Erbium used concentration. The photoluminescence of porous silicon (PSi) was increased at about 12%. It was also found that the photoluminescence became stable at certain point after the dopant solution continually to increase. All samples show a broad nanocrystal-related luminescence spectrum centered around 700 nm to 725 nm. So it concluded that the porous silicon doped with erbium is able to increase the photoluminescence intensity.