

The comparative analyses of S or Se passivated GaAs surfaces

(Sulfur 또는 selenium으로 처리된 GaAs 표면의 상호비교분석)

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It has been announced that the improvement of electronic properties of GaAs device is obtained by passivating the surface with sulfur or selenium. Especially many results are reported as the treatment of GaAs surface with $(\text{NH}_4)_2\text{S}_x$ solution results in the efficient reduction of surface state density and Schottky barrier height, and suppression of surface oxidation. Concerning with Se, the variety of forms such as Se flux and NaSe solution have been also studied and Se turns to be a promising material for passivating GaAs. However the results are announced for the improvement of the surface properties after the treatment with the above solutions, the comparison of passivation effects between two above treatments is not yet carried out precisely. In this study, we performed the analysis of GaAs surface before and after the various passivating treatments using angle-resolved X-ray photoelectron spectroscopy. This is a non-destructive technique for identifying the chemical bonding states and compositional variations in near surface layers. Sulfur and selenium passivations of GaAs have been carried out in a glove box system under controlled atmosphere with nitrogen using $(\text{NH}_4)_2\text{S}_x$ solution and NaSe solution, respectively. The passivation effects of S or Se and the reactivity of the elements with GaAs surface were discussed.