한국신·재생에너지학회 2007년도 추계학술대회논문집 pp.274

Charge Transfer across a ZnO/Electrolyte Interface Induced by Sub-Bandgap Illumination

Liudmila Larina[2], and Byung Tae Ahn[1]*

Key words : ZnO/electrolyte interface, sub-bandgap illumination, surface states

Abstract : The role of interfacial band gap states in sub-bandgap photoinduced electron transfer across a ZnO/electrolyte junction has been analyzed using time-resolved photocurrent measurements in the millisecond regime. The crystallographic structure and morphology of ZnO samples were characterized using XRD and SEM measurements. A kinetic model for charge carrier transport at the ZnO/electrolyte interface based on the intermediacy of the surface states was developed, and the rate equations were analytically solved. A theoretical simulation of the intensity-dependent photocurrenttransients was also conducted. Based on an analysis of the experimental data and theoretical predictions, the density of the surface states was determined to be $3.1 10^{13}$ cm^{-2} and the capture cross section was $1.5\ \ 10^{-16}$ cm^2. The obtained experimental results are consistent with the developed kinetic model based on a surface-state mediated charge transfer mechanism.

1) 한국과학기술원 신소재공학과
E-mail : btahn@kaist.ac.kr
Tel : (042)869-4220 Fax : (042)869-3310
2) 한국과학기술원 신소재공학과
E-mail : llarina@yahoo.com
Tel : (042)869-4260 Fax : (042)869-3310