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# Probing Polarization Modes of Ag Nanowires with Hot Electron Detection on Au/$TiO_2$ Nanodiodes

**Young Keun Lee, Jaemin Lee, Hyosun Lee, Jung-Yong Lee, Jeong Young Park**

Graduate School of EEWS (WCU) and NanoCentury KI, KAIST, Daejeon 305-701, Korea

Nanostructured noble metals have been attractive for their unusual optical properties and are widely utilized for various purposes. The optical properties mainly originating from collective electron oscillation can assist direct energy conversion via surface plasmon resonances. Here, we investigated the effect of surface plasmons of silver nanowires on the generation of hot electrons. It is reported that the surface plasmons of silver nanowires exhibit longitudinal and transverse modes, depending on the aspect ratio of the nanowires. In order to measure the hot electron flow through the metallic nanowires, chemically modified Au/TiO2 Schottky diodes were employed as the electric contact. The silver nanowires were deposited on a Au metal layer via the spray method to control uniformity and the amount of silver nanowire deposited. We measured the hot electron flow generated by photon absorption on the silver nanowires deposited on the Au/TiO2 Schottky diodes. The incident photon-to-current efficiency was measured a function of the photon energy, revealing two polarization modes of siliver nanowires: transverse and longitudinal modes. UV-Vis spectra exhibited two polarization modes, which are also consistent with the photocurrent measurements. Good correlation between the IPCE and UV-vis measurements suggests that hot electron measurement on nanowires on nanodiodes is a useful way to reveal the intrinsic properties of surface plasmons of nanowires.

**Keywords:** Silver nanowire, Polarization, Surface plasmon resonance, Hot electron, Schottky diode, Photon