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## UV Photo Response Driven by Pd Nano Particles on LaAlO<sub>3</sub>/SrTiO<sub>3</sub> Using Ambient Control Kelvin Probe Force Microscopy

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High-mobility and two dimensional conduction at the interface between two band insulators, LaAlO<sub>3</sub> (LAO) and SrTiO<sub>3</sub> (STO), have attracted considerable research interest for both applications and fundamental understanding. Several groups have reported the photoconductivity of LAO/STO, which give us lots of potential development of optoelectronic applications using the oxide interface. Recently, a giant photo response of Pd nano particles/LAO/STO is observed in UV illumination compared with LAO/STO sample. These phenomena have been suggested that the correlation between the interface and the surface states significantly affect local charge modification and resulting electrical transport. Water and gas adsorption/desorption can alter the band alignment and surface workfunction. Therefore, characterizing and manipulating the electric charges in these materials (electrons and ions) are crucial for investigating the physics of metal oxide. Proposed mechanism do not well explain the experimental data in various ambient and there has been no quantitative work to confirm these mechanism. Here, we have investigated UV photo response in various ambient by performing transport and Kelvin probe force microscopy measurements simultaneously. We found that Pd nano particles on LAO can form Schottky contact, it cause interface carrier density and characteristics of persistence photo conductance depending on gas environment. Our studies will help to improve our understanding on the intriguing physical properties providing an important role in many enhanced light sensing and gas sensing applications as a catalytic material in different kinds of metal oxide systems.

**Keywords:** KPFM, Oxide, LaAlO<sub>3</sub>/SrTiO<sub>3</sub>, Photoresponse

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## 적외선 차폐를 위한 고 투과성 상온 ZnO 박막에 관한 연구

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ZnO는 큰 엑시톤 결합에너지(60 meV)와 넓은 밴드갭(3.36 eV)을 가지고 있어 광소자 분야에서 다양하게 연구 되어지고 있다. 또한 높은 광 투과도로 인해 여러 투명 제품 분야에도 적용되어지고 있다. 본 연구에서는 높은 가시광 투과도와 함께 근적외선 차폐를 위한 스마트 필름 제작을 위해 RF sputter를 이용하여 상온에서 ZnO 나노박막을 제작하여 광학적인 특성들을 분석하였다. 실험은 Glass 와 PET 위에 동시에 성장시켜 RF power 변화와 Ar, O<sub>2</sub>의 가스 분압비, Working Pressure의 변화를 변수로 두어 진행하였다. 측정은 Ellipsometry를 이용하여 광학적인 두께와 굴절률을 조사하였고 UV visible spectrometer를 통해 광학적인 투과도를 확인하였다.

**Keywords:** RF Sputter, Ellipsometry, Refractive Index, Zinc Oxide