

# Nanoscale Plasmonic and Optical Modulators Based on Transparent Conducting Oxides

Zhaolin Lu, Wangshi Zhao, Kaifeng Shi

(Submitted on 2 May 2012)

Recent experiments showed that unity-order index change in a transparent conducting oxide (TCO) can be achieved in a metal-oxide-semiconductor (MOS) structure by accumulation charge. However, the ultrathin (~5nm) accumulation layer and inherent absorption of TCOs impede the practical applications of this effect. Herein, we propose and explore a novel waveguide, namely "TCO-slot waveguide", which combines both the tunable property of a TCO and field enhancement of a slot waveguide. In particular, light absorption can be sharply enhanced when the slot dielectric constant is tuned close to zero. Based on TCO-slot waveguides, efficient electro-absorption modulation can be achieved within 200 nm with small insertion loss.

Comments: 4 figures

Subjects: **Optics (physics.optics)**; Materials Science (cond-mat.mtrl-sci)

Cite as: **arXiv:1205.0502 [physics.optics]**

(or **arXiv:1205.0502v1 [physics.optics]** for this version)

## Submission history

From: Zhaolin Lu [[view email](#)]

[v1] Wed, 2 May 2012 17:47:33 GMT (259kb)

*[Which authors of this paper are endorsers?](#)*

## Download:

- [PDF only](#)

Current browse context:

[physics.optics](#)

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1205](#)

Change to browse by:

[cond-mat](#)

[cond-mat.mtrl-sci](#)

[physics](#)

References & Citations

- [NASA ADS](#)

Bookmark([what is this?](#))



Science  
WISE