

Alex → Rob

COSTP2 meeting, Hungary

Abstract for COSTP2, Hungary (May 2004)

SWITCHING APPLICATIONS IN DOMAIN- ENGINEERED LiNbO₃

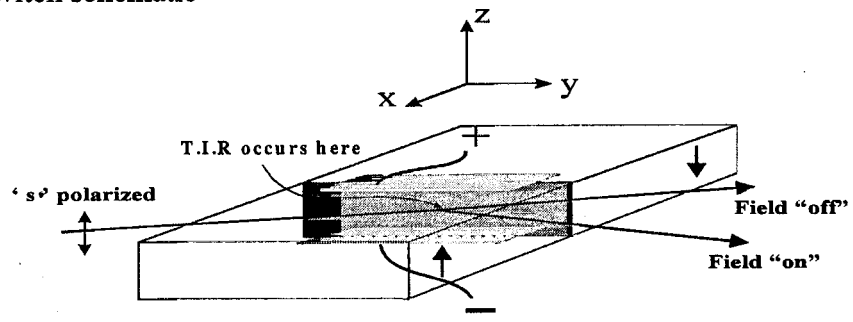
Alexander J Boyland, Sakellaris Mailis, Robert W Eason.

Optoelectronics Research Centre, University of Southampton, Southampton, SO17 1BJ, UK

We have developed a novel electro-optically addressable total internal reflection (TIR) switch in a sample of z-cut domain-engineered congruent LiNbO₃, [1]. Electric field poling has been used to domain invert one half of the sample, producing a sharp boundary between the two anti-parallel domain regions. Such a switch has numerous advantages including ease of fabrication, high switching contrast ratios, (TIR is a 100% efficient process for reflection at an ideal interface), relatively low drive voltages, and a wavelength dependence that is less critical than other electro-optic devices such as Pockels cells.

An electric field, E_z , applied across the interface region (E parallel to z axis) produces equal magnitude refractive index changes of opposite sign between the adjacent anti-parallel domain regions. If this value of index change is sufficiently large, TIR can occur for a beam incident on the interface at grazing incidence, switching from transmission to reflection. A schematic for the TIR switch is shown in figure 1. The incident light was from a linearly polarized green He-Ne laser. We will report the initial results achieved for electro-optically modified reflectivity versus applied electric field, for light of s and p polarisations, and wavelengths in the visible and near I.R.

Figure1. Switch schematic



[1] A.J. Boyland, G.W. Ross, S.Mailis, P.G.R. Smith, R.W. Eason 'Electro-optically addressable total internal reflection switch in domain-engineered LiNbO₃' Sub. Elec. Lett. (2000).