DIRECT-WRITE e-BEAM PERIODICALLY POLED ~400 nm DOMAINS IN LITHUIM NIOBATE THIN FILMS GROWN BY LIQUID PHASE EPITAXY

J. Son, Y. Yuen, S.S. Orlov, B. Phillips, L. Galambos, V.Ya. Shur[1]*, L. Hesselink*

Solid State Photonics Lab., Stanford University
(*Stanford, CA 94305, U.S.A.*),
[1]Institute of Physics and Applied Mathematics,
Ural State University
(*Ekaterinburg 620083, Russia*)

S u m m a r y

We demonstrate sub-micron ferroelectric domain engineering in liquid phase epitaxy (LPE) $LiNbO_3$ thin films grown on $LiNbO_3$ and $LiTaO_3$ substrates using a direct-write electron beam poling method. $LiNbO_3$ thin films of several-micron thicknesses were grown using a flux melt of 20 mol% $LiNbO_3$—80 mol% $LiVO_3$. To engineer domain structures in Z^- oriented LPE $LiNbO_3$ films, a direct-write electron beam poling method was implemented. We achieved 300—400 nm wide domains spanning over 50 μm with a period of 1.1 μm. It is also shown that we can engineer the domain structure of LPE $LiNbO_3$ films by using direct e-beam poling, even though the domain orientations of the film and the substrate are of opposite polarity. By comparing the e-beam poling behavior in a congruent $LiNbO_3$ single crystal and a LPE $LiNbO_3$ film, it is shown that LPE $LiNbO_3$ supports a much enhanced periodically poled structure than bulk single crystal material.