

### 3.6 Lattice Matched Growth of LiNbO<sub>3</sub> Thin Films on LiTaO<sub>3</sub>

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LiTaO<sub>3</sub> and LiNbO<sub>3</sub> are closely related polar materials with high figures of merit for electrooptic, nonlinear optic, pyroelectric, piezoelectric and surface acoustic wave applications. Presently, they are used mainly in the bulk form which has its limitations on the applicability and performance of different devices. The availability of these materials as high quality thin films would increase their potential and open new areas of application. Both materials exhibit the same crystalline structure with a mismatch of the hexagonal a-parameter of only 0.12%. A good single crystalline heteroepitaxial growth is therefore expected.

Thin films and superlattices of LiTaO<sub>3</sub> and LiNbO<sub>3</sub> were grown on (0001) LiTaO<sub>3</sub> and LiNbO<sub>3</sub> wafers by molecular beam epitaxy. Films were c-axis oriented but showed in-plane 60° rotational domains. A superlattice structure with a bilayer period of 10 nm was grown on LiNbO<sub>3</sub>. It showed well defined interfaces and appeared to be strained (Fig. 6).

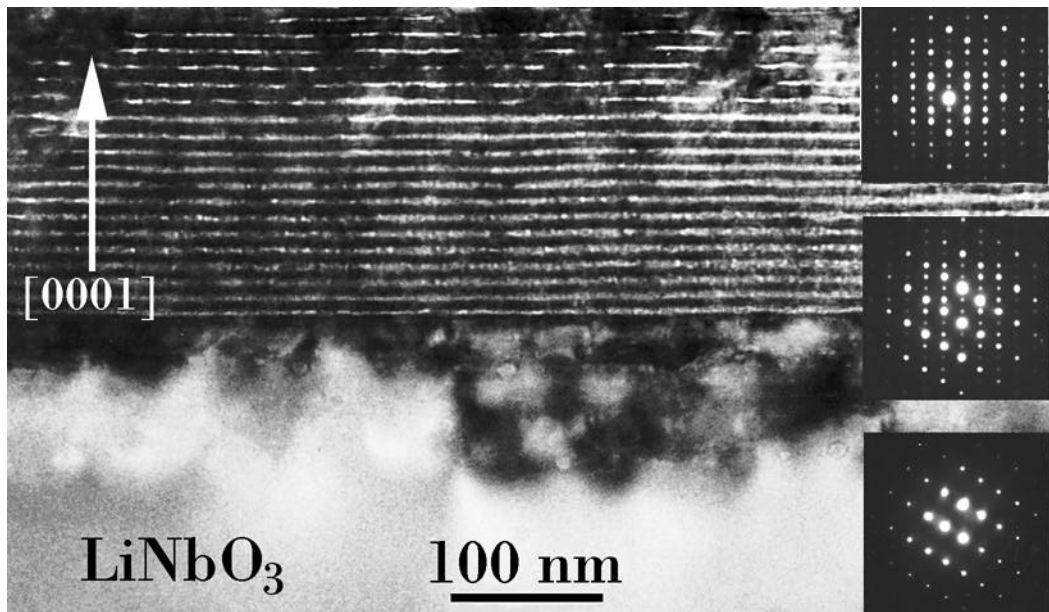


Fig. 6 TEM image of LiNbO<sub>3</sub>/LiTaO<sub>3</sub> superlattice grown on (0001) LiNbO<sub>3</sub>