LATTICE SITE FOR EUROPIUM IN LiNbO_3
BY ION CHANNELING EXPERIMENTS

L. REBOUTA*, J. C. SOARES*, AND M. F. DA SILVA*, J. A. SANZ†, E. DIÉGUEZ†,
AND F. AGULLÓ-LÓPEZ†

* Departamento de Física, Universidad de Lisboa, Portugal

† Departamento de Física Aplicada, Universidad Autónoma de Madrid, Cantoblanco,
28049 Madrid, Spain

LiNbO_3 is a relevant material to prepare a number of electrooptic (bulk and waveguide) devices. Moreover, its photorefractive (PR) behavior is also potentially useful for optoelectronic applications such as holographic storage and coherent optical amplification. For a full understanding and optimization of the PR effect, the lattice location and valence state of the active impurities is essential, since they determine the ionization and trapping capabilities for free carriers. So far, the information obtained with spectroscopic techniques (EPR, ENDOR, Mossbauer, optical) is not conclusive, except manganese and possible iron.

In this paper we report on an investigation of the lattice location of Eu by ion-channeling techniques. They provide a rather direct method, largely relying on geometrical considerations, which is very adequate for semiquantitative analysis. Eu has been chosen because its heavy mass produces a RBS peak well separated from the host contribution. Results conclusively show that Eu^{3+} lies partly on both Li and Nb sites (36% and 64%, respectively), but not on the intrinsic vacant lattice sites.