



ELSEVIER

Nuclear Instruments and Methods in Physics Research B 181 (2001) 134–139

NIM B
 Beam Interactions
 with Materials & Atoms

www.elsevier.com/locate/nimb

Light detection with spectral analysis at the Legnaro nuclear microprobe: Applications in material and earth sciences

E. Vittone ^{a,*}, A. Lo Giudice ^a, C. Manfredotti ^a, G. Egeni ^b, V. Rudello ^b, P. Rossi ^c,
G. Gennaro ^d, G. Pratesi ^e, M. Corazza ^f

^a *Experimental Physics Department, Solid State Physics, University of Torino, INFN-To, INFN-UniTo, via Pietro Giura 1, 10125 Torino, Italy*

^b *LNL-INFN National Laboratory of Legnaro, Italy*

^c *Physics Department, University of Padova, Italy*

^d *INFN-Pd, Italy*

^e *Natural History Museum, University of Florence, Italy*

^f *Department of Earth Science, University of Florence, Italy*

Abstract

Among the numerous ion beam analytical (IBA) techniques available for material characterisation, ionoluminescence (IL) has not attracted the interest that it should deserve. Although the importance of IL technique, particularly if combined with other IBA techniques, has been widely proven, very few apparatuses to analyse light emission spectra have been installed at the microbeam facilities. In this paper we present the new IL apparatus installed at the Legnaro (LNL) Ion Microbeam Facility. The system is a modification of the OXFORD MONOCL2 apparatus for cathodoluminescence. Light collection is performed by using a retractable parabolic mirror located at a very short distance from the sample, with a small aperture to allow the ion beam to hit the sample. Accurate positioning of the retractable mirror directly coupled to a chamber mounted high-resolution monochromator allows for high light collection efficiency. This design assures that IL can be used with low beam currents (<1 pA) with the consequent reduction of the radiation damage, which often occurs during ionoluminescence measurements. A summary of some meaningful results obtained with such an apparatus is presented. The combination of IL/PIXE was used to characterise natural silica glass, known as Libyan Desert Glass, and cubic BN grains; polycrystalline CVD diamond has been studied by a synergetic combination of IBICC/IL technique. © 2001 Elsevier Science B.V. All rights reserved.

PACS: 78.60.Hk; 61.16.-d

Keywords: Libyan desert glass; PIXE; IL; IBICC; Cubic BN; CVD diamond

1. Introduction

Ion beam induced luminescence (IBIL or IL) is the emission of light as the result of energetic ions bombardment. The study of such a phenomenon

* Corresponding author. Tel.: +39-11-670-7317; fax +39-11-669-1104.

E-mail address: vittone@to.infn.it (E. Vittone).