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Cytological and histological structures identification with the technique IBIL in elemental microanalysis

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Abstract

Ion beam induced luminescence (IBIL) is applied to the inspection of histological and cytological specimens, dried and placed in vacuum. It is shown to offer a way for a precise aiming of a proton microbeam on the sample for a subsequent traditional microanalysis. We used the nuclear microprobe of the Laboratori Nazionali di Legnaro and its IBIL facility to identify biostructures stained with some usual fluorescent dyes, capable of discriminating tissues and cells of different nature or different parts of a cell. To this purpose we produced low dose IBIL maps of the region of interest, employing a high sensitivity light detector. We describe the experimental set-up, propose a peculiar support for specimens, specify the properties of few widespread used staining procedures and evaluate their IBIL emission. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

The micro-PIXE analysis of biomedical samples and above all of a cytological preparation, with isolated cells, is generally considered a diffi-

cult task as far as sample preparation and on-line cell identification are concerned [1–3].

The on-line identification can often not be obtained with a PIXE elemental map, the visible elements ($Z > 10$) being present only at trace level. Optical observation would be possible only when tissues have been previously stained. Also in this case, optical observation is often ineffective in practice because many microprobe installations do not have a microscope with accuracy of 1 μm , and, however, when this is achievable, a severe

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