

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

Optoelectronic Fiber Based Fluorescence Detection

Sensor Systems.

By

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The goal of this Dissertation is study, design, and implementation of fiber based fluorescent sensors and sensing techniques. Novel techniques for Emission-Excitation fluorescent analysis and the time resolve method are offered, studied and presented. A novel type of Emission-Excitation Fluorimeter (EEF) with Linear Interference Filters (LIF) as the wavelength selective elements is proposed. The method of the selective detection for mixture of different fluorescent samples was developed. The limits in resolution LIF based EEF were found analytically and experimentally. Proposed the use of a single photon sensitive Time Resolve Spectroscopy (TRS) as an additional identification parameter to avoid a high dependence of EEF on the temperature.

A new technique of direct decay time measurement was offered, studied and tested to make TRS free of any optical filters, based on proprietary patented Single Photon Time Interval (SPTI) method, which was tested as the main part of novel long-life oxygen and temperature sensors.

In the frame of this research a concept of FPGA core units (coreboards) was offered, allowing the use of the same set of hardware in lots of different applications. A few generations of FPGA core units were designed, prototyped, manufactured and tested. The concept of FPGA coreboards made possible to design a whole family of FPGA based SPTI control devices and perform series of experiments and tests.

A new flexible and low-cost rapid prototyping technology was developed and used. For fast and low cost optoelectronic prototyping a family of novel C-mountable devices was proposed, including fast modulated LED optical sources, 2-D adjustable holders, posts and mounts, dielectric and diamagnetic optical and electro-optical breadboards and many more.

Presented research was supported by several industrial and state grants. In frame of the research 3 articles were submitted (1 already published), 3 new technology disclosures, 1 invited presentation (annual 2006 AVS meeting) and presentation on LIFT 2006 and annual 2007 "New LI Technologies" exhibition were made.

Date: May 4, 2007

Time: 10:00am

Place: Old Chemistry Bldg, Room No.211

Program: ECE

Dissertation Advisor: Serge Luryi