Optical Materials 33 (2010) 117–118

Contents lists available at ScienceDirect

Optical Materials

journal homepage: www.elsevier.com/locate/optmat

Preface

Co-chairs of PRE'10 Workshop and some members of the Scientific Committee (from left: S. Tanabe, J. Heo, J.-L. Adam, G. Boulon, M. Bettinelli, M. Ferrari, R. Reisfeld, G.C. Righini, M. Mikami, S. Pelli, A. Jha)

Rare earths (REs) represent a group of strategic materials which nowadays play a very important role in several high-tech sectors, from consumer electronics to automotive industry. A curiosity: despite their name, rare earths are not particularly rare, but at the same time there are not many mining deposits in the world which are economically exploitable, so that over 95% of the current global production comes from China.

In the area of photonics as well as in other areas, such that of scintillating materials for high-energy radiation detectors, the most relevant property of rare earths is their luminescence. Examples of applications of photoluminescence which are attracting an increasing interest are those in the field of energy-efficient and/or wavelength converting materials, to be used in phosphors for CRT's, plasma displays and lighting (esp. white light emitting) devices, or to increase the efficiency of photovoltaic cells. Not by chance, the key lecture at the opening of the third Workshop on Photoluminescence in Rare Earths: Photonic Materials and Devices (PRE'10) was given by Prof. Renata Reisfeld with the title "New developments in solar energy utilization".

PRE'10 had the aim of providing a forum for material scientists, chemists and physicists where to debate about the state of the art and the perspectives of the photonic materials based on rare earth ions. The Workshop, promoted by the Italian Society of Optics and Photonics (SIOF) and the Italian Committee *Fotonica.it*, under the sponsorship of TC-20 Committee of the International Commission on Glass, was held in Florence, Italy, on April 28–30, 2010, following the two previous Workshops, both held in Trento, Italy, in 2005 and 2007, respectively.

PRE'10 was very successful, with over 100 participants from 17 Countries, showing a significant increase with respect to PRE′07. More than 90 papers were contributed, in different formats: there were 13 invited, 43 oral and 37 poster presentations. As in the previous Workshops[1,2], the presenters were entitled to submit a full paper for publication in Optical Materials, after the standard peer review procedure. The result of this process is constituted by the

[1] Special Issue on PRE'05, Optical Materials vol. 28, issue 11 (August 2006)
[2] Special Issue on PRE'07, Optical Materials vol. 31, issue 9 (July 2009)

0925-3467/$ - see front matter © 2010 Published by Elsevier B.V.
doi:10.1016/j.optmat.2010.11.007

present Special Issue, that contains 26 papers, providing an excellent sample of the subjects discussed during the two intense days of meeting.

Following the order in which they appear in this issue, a first group of papers deals with rather fundamental spectroscopic properties of RE-doped glasses and crystals, and with the synthesis of innovative materials. A second group concerns the characteristics of efficient phosphors and the up- and down-conversion phenomena which can be exploited for energy-efficient photovoltaic or lighting devices. Particular attention is devoted to the study of the effects of controlled crystallization processes and of the creation of nanostructured glass ceramics. The year 2010 has been celebrating the 50th anniversary of the first laser demonstration, and indeed a plenary talk at the Workshop opening, given by Prof. Georges Boulon, was on "Main keystones for solid-state laser materials"; thus, also in this Special Issue a number of papers is concerned with optical amplification, laser materials and devices, and active thin films and optical fibers.

All the PRE'10 participants expressed their appreciation for the informal atmosphere, the warm hospitality, and the excellent scientific level. Sincere thanks are therefore due to all the members of the Scientific and Organizing Committees, who did their best to assemble a valuable technical program and to smoothly run the Workshop. The support of the sponsoring organizations is also gratefully acknowledged (and the interested reader is referred to the web page of the Workshop http://www.ifac.cnr.it/PRE10 for the full list of sponsors and also for a gallery of photos taken during the sessions and the social events); particular thanks are due to the National Research Council of Italy (CNR), which supported the Workshop through the Department of Materials and Devices (DMD), the Nello Carrara Institute of Applied Physics (IFAC), the Institute of Photonics and Nanotechnology (IFN) and the Research Area in Sesto Fiorentino (Florence).

I also wish to thank the Optical Materials Editor-in-Chief, Prof. George Boulon, who offered us the possibility of this Special Issue, and the Elsevier staff for their precious help.

Last but definitely not least, let me say that the success of PRE'10 Workshop has also been largely due to my co-chairs, Dr. Maurizio Ferrari (IFN – CNR) and Prof. Setsuhisa Tanabe (Kyoto University): working with them has always been a personal pleasure and a stimulating scientific adventure. We are already working for the next Workshop: Prof. Tanabe will welcome the participants in Kyoto, Japan, where PRE'12 will be held on March 27–29, 2012.

Mark the date in your calendar, and see you in Kyoto!

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Available online 19 November 2010