PREFACE

The International Conference on Laser Science and Applications held between 15-18 January 2007 (ICLSA-07) is the sixth conference held at the National Institute of Laser Enhanced Sciences (NILES) in Cairo University. Lasers and their uses are the most dominating fields of research in the 21st century. The technical program featured three topics comprising basic and applied fields in the laser world:

- Topic I Basics of Laser Science
- Topic II Laser Applications in Engineering
- Topic III Laser Applications in Medicine

- **Topic I: Basics of Laser Science**

It included subjects that were classified into: generation of attosecond high harmonic laser pulses and their characterization, which has been explained basically by the distinguished Prof. Dr. Chang Hee Nam, Director of the Korean Coherent X-ray Research Center CXRC at the Physics Department of the Korean Advanced Institute of Science and Technology (KAIST) at Daejon. Such method points to this important field as the promising way of achieving x-ray laser technology. Types of high power lasers and their use in machining of metals were discussed by Prof. Dr. Chatwin from the University of Sussex. Professor Dr. Lotfia El Nadi, initiator of NILES with her vision on important future fields of laser science, speculated with Prof. Mohy Saad, Dean of NILES, the prospectives of ultrahigh power short pulse lasers and their present and forthcoming use as laser accelerators, pointing out the possibilities of upgrading the existing facilities at NILES, with her student M. Atef Reda. She and her school discussed the use of optical forces to manipulate atoms. Professor Yehia Badr, ex-Dean of NILES, and his school presented their results on some optical materials as promising new active laser media. Automated stabilization and optimization of laser beams were included as well as studies on propagation of lasers in air and inert gas mixtures.

- **Topic II: Laser Applications in Engineering**

The presentation by Prof. R. Salimbeni, the famous Italian archeology scientist, dealt with the applications of laser technology in the field of conservation of artworks, putting in mind Egypt as the host of the most ancient archeological monuments. Technology aided conservation of building heritage using methods for 3 dimensional visions were discussed. Simulation and engineering of resonators, optical materials and design of some optical digital circuits as important research results were also included. Laser applications in engineering introduced versatile subjects.

- **Topic III: Laser Applications in Medicine**

It is a topic that delivered detailed scientific information on one of the most important subjects of laser applications namely: Laser applications in medicine and biology. The subjects discussed could be summarized as photo induced effects on bacterial cells, with detailed results on normal and leukemic peripheral blood cells. The method applied by Prof. Dr. Mohamed El Batanouny and his school using photosensitizers points to highly important ways of utilizing laser technology in the medical field. Professor Dr. B. Kramer, a pioneer scientist in her field, introduced the international community to the promising field of molecular mechanisms and aptosis in photo dynamic therapy. The students of Prof. Mohamed Abdel-Harith, ex-Dean of NILES, surveyed the laser application techniques in follow up of metal toxicity in some important botanic species.

The presentations of some distinguished international invited lecturers have not been included in this proceedings, but we have to acknowledge their efforts in presenting their fields of research. In the following, arranged in alphabetic order of the names of the contributors, we present the titles of their talks delivered during the sessions of this conference:

1. Elizabeth Giacobino, École Normal Supérieure & CNRS, France. Quantum Optics & Quantum Communication.
2. Hilal A. Fattah, Atomic Energy Authority, Egypt. Quantification of Heavy Metals in New Materials by Laser Ablation.
3. Jai Pal Mittal, Bhabha Atomic Research Center, India. IR Laser Multiphoton Dissociation.

4. Mahmoud H. Abdelkader, German University, Egypt. Laser PDT: Oncological and Nononcological Applications
5. Mohy S. Mansour, Cairo University, Egypt. Laser Diagnostics for Combustion Systems.
6. Mohamed Raafat El Gewely, University of Tromsø, Norway. Gene Reconstruction and Transfection for Cell Engineering.
7. Mostafa El Sayed, Georgia Institute of Technology, USA. Nanogold Technology in Laser Cancer Therapy.
8. Mushera Salah El Din, Cairo University, Egypt. Laser Technology in Dentistry.

This proceedings highlights the main contributions that were presented and provided by the excellent authors in a perfect and timely manner.

I would like to express my sincere thanks to the Authorities of Cairo University specially Prof. Dr. Ali Abdel Rahman the President and Honorary Chairman of the conference, the Atomic Energy Authority of Egypt, the German University in Egypt, the International Arab Company for Optical Materials and the Topical Society of Laser Sciences for their generous financial support without which the conference would not have been possible.

I am greatly indebted to Prof. Dr. Mohy S. Mansour, Chairman of the conference and Dean of NILES for his encouragement and support which greatly helped to shape and accomplish the ICLSA-07 conference.

Utmost thanks to be stated to Engineer Dr. Jala El-Azab and Biologist Dr. Rehab Amin for giving celibacy efforts and facilities for mass communication, computational activities and information transfer. Without their efforts this book would not be have been accomplished.

In conclusion, it is worthwhile to mention the main annotations taken by the participants who attended the closing session that was held on 18th January 2007.

FIRST: They proposed establishing a society by the name ASALA to strengthen the scientific and social relations between the Arab countries for researchers working in laser application fields.

SECOND: Interaction between participants was excellent since plenty of time for discussions was available and social cultural atmosphere was developed.

THIRD: More young research students should be encouraged to attend such conference and well studied projects should be designed and ready to forward and implement international cooperation with the International participants.

Finally, I would like to thank all who, directly or indirectly, have helped to accomplish this proceedings. In years to come, I will devote my time and energy to further establish possibilities for Egyptian laser scientists to be involved in the fascinating world of high technology.

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