



**VIU**  
Venice  
International  
University

Isola di S. Servolo

Venezia – Italy

July 13 – 20, 2014

4<sup>th</sup> International School on  
***Lasers in Materials Science***

The 4<sup>th</sup> International School on ***Lasers in Materials Science*** will offer a comprehensive overview on basic principles and a selection of relevant applications connected to the irradiation of materials with energetic laser beams. The fourth school benefits from the positive experiences of the first three editions of the School, which took place at the very same wonderful location in the lagoon of Venice in 2008, 2010 and 2012.

The school will try to shed light on the question: “How can we use laser light to develop new materials with specific control of their properties at the nanometer scale?” This field is relatively young and has tremendously grown in worldwide research activities in the last years.

One area of interest is the use of lasers in deposition processes as it is possible to deposit virtually any material, including multi-component compounds, preserving the composition of the ablated target, and often avoiding post-deposition thermal treatments. The experimental setup involved in pulsed laser deposition (PLD) is generally supported by in situ diagnostics of both the plasma and the growing film. The understanding of the basic laser-surface interaction mechanisms are a challenge to scientists, while engineers are mostly interested in the characteristics of the deposited materials and in the possibility to tailor their properties through appropriate tuning of the deposition parameters.

In addition, lasers can induce both bulk and surface material modifications in a highly controlled and speedy fashion. Examples are the production of surface nanostructures as well as nanoparticles. These laser-induced changes can strongly affect the transport properties of the irradiated material.

Finally, yet importantly, a wide range of applications and characterization techniques involve the investigation of the laser-matter interaction mechanisms at a basic level. Plasmonics is only one quickly developing field among many others that requires such knowledge.

Some of the hot topics that emerged in recent years include the use of ultra-short laser pulses to explore electronic excitations and transient material properties under highly non-equilibrium conditions, the synthesis of nanoparticles and their assembly to prepare nanocrystalline films and the deposition of metastable systems.

In contrast to usual International Conferences where researchers try to focus on their newest experiments, the school aims in a more interactive and educational way. Based on the success of the previous editions of the School, the Fourth Edition aims to educate students at all levels (graduate students, Ph.D. students) and young scientists in all aspects of laser material processes, in the principles of laser-materials interactions, laser ablation and deposition processes, materials modifications, and the laser based production of nanostructures for technical applications. A main emphasis of the school, besides the lectures, is an intensive interaction between the lecturers and the attendees of the school. Attendees are also asked to shortly present some own work to foster the interactive discussions.

The School will focus on experimental and theoretical investigations of laser-induced phenomena. The school topics include: laser-surface and laser-bulk interactions, the role of defects, non-linear absorption phenomena, surface melting, vaporization, superheating, homogeneous and heterogeneous nucleation, phase explosion and plasma formation, nanosecond, picosecond, femtosecond and attosecond laser pulses, film synthesis by pulsed laser deposition, nanoparticle nucleation, growth and assembling, laser nanostructuring of soft matter, the development of new light and X-rays sources, free electron lasers, laser interaction with biological tissue, and some more. The classes of considered materials span the entire realm of technological interest and include metals, semiconductors, wide band gap insulators, ceramics, glasses, composites, organics, and biological matter.

The main experimental techniques to characterize solids and surfaces before, during and after irradiation, the plasma plume and the deposited film are addressed as well. The true interdisciplinary nature of the School will help promoting fruitful interactions between researchers from such diverse fields as solid state and plasma physics, chemistry of materials, metallurgy, ceramic, and polymer science. Although the school mainly aims towards the level of a PhD student, we promise that the School will also be beneficial for advanced undergraduate and Master students, as well as postdoctoral researchers.

The positive responses to and the success of the previous editions of the School (for more info, please visit <http://www.slims.polimi.it/>) encouraged the Scientific Committee to plan the Fourth Edition in the same place and maintaining the same scientific and organizational structure as in the past editions, while also aiming at some improvements. The facilities of the Venice International University (VIU) resulted to be excellent, and San Servolo island, a beautiful, quiet garden-like island in the lagoon of Venice, facilitates an intensive interaction among all participants and lecturers. San Servolo is reached within minutes by vaporetto (the name of the boats in Venice) from San Marco Square, the very center of Venice with its exciting cultural, touristic, and recreational life.

The School can host about 50 students. Attention will be given to keep a truly international character of the event by the appropriate selection of the participants.

Speed up and send your application for being part of the 2014 Laser School in Venice. Application forms and more information are found at the website:

<http://www.slims.polimi.it/>

We are looking forward to meet you in Venice in July 2014!

The School Directors

Nadezhda M. Bulgakova

Yongfeng Lu

Peter Schaaf

Paolo M. Ossi

## **Organization**

In order to stimulate scientific interactions between lecturers and students, as well as among the students, the following timetable will be adopted:

### **Monday, July 14**

08.45 – 9.15 Opening Ceremony

09.30 – 10.15 Lecture + discussion

10.35 – 11.20 Lecture + discussion

11.40 – 12.30 Poster Session 1

12.35 Lunch

14.00 – 14.45 Lecture + discussion

15.00 – 16.30 Oral presentations by students (8 presentations, 10 min each)

16.45 – 17.35 Classroom 1

17.45 – 18.50 Oral presentations by students (6 presentations, 10 min each)

19.00 Dinner

### **Tuesday, July 15**

09.00 – 09.45 Lecture + discussion

10.00 – 10.45 Lecture + discussion

11.00 – 12.00 Oral presentations by students (5 presentations, 10 min each)

12.10 Lunch

13.30 – 14.15 Lecture + discussion

14.35 – 16.10 Oral presentations by students (9 presentations, 10 min each)

16.30 – 17.20 Classroom 2

17.30 – 18.50 Poster Session 2

19.00 Dinner

### **Wednesday, July 16**

09.00 – 09.45 Lecture + discussion

10.00 – 10.45 Lecture + discussion

11.05 – 11.50 Lecture + discussion

12.00            Lunch

Afternoon Free

19.00            Dinner

### **Thursday, July 17**

09.00 – 10.30 Oral presentations by students (8 presentations, 10 min each)

10.50 – 11.20 Lecture + discussion

11.25 – 12.20 Classroom 3

12.25            Lunch

14.00 – 14.45 Lecture + discussion

15.05 – 15.50 Lecture + discussion

16.10 – 18.00 Poster Session 3

19.00            Dinner

19.30 –          Social activity in S. Servolo

### **Friday, July 18**

09.00 – 09.45 Lecture + discussion

10.00 – 10.45 Lecture + discussion

11.05 – 11.50 Lecture + discussion

12.00            Lunch

13.45 – 14.30 Lecture + discussion

15.00            Guided tour at a cultural event in Venice downtown

19.00            Dinner

### **Saturday, July 19**

09.00 – 09.45 Lecture + discussion

10.00 – 11.00 Round Table (topic to be confirmed)

11.20 – 12.30 R. Kelly Award Ceremony and Closing Remarks

12.35            Lunch

All attending students are asked to bring a poster with recent relevant results of her/his research activity. All the posters will be on display from the first day throughout the whole school.

Three oral poster sessions are scheduled during the week and awards will be given for the best posters and poster presentations.

In addition, there will be socializing events, such as an excursion, a social evening, and maybe more.

Full board is provided to all participants with their accommodation at San Servolo VIU.