

COST MP0601 Short Wavelength Laboratory Sources

Training School, Warsaw 28 May 2008

Scientific Report

The Training School on **EUV Optics and Technology** was organized at the Laser-Matter Interaction Laboratory (LMIL) of the Institute of Optoelectronics, MUT. LMIL has unique equipment and expertise on the generation of extreme ultraviolet (EUV) radiation from a laser plasma source based on a gas puff target and on processing organic polymers using EUV light.

The laboratory training was preceded by lectures to introduce students to EUV optics and technology and to provide the background knowledge needed for the practical activities in the laboratory. The lectures were given by recognized specialists in the field of EUV optics and technology. The titles of the lectures were: (1) An introduction to plasma physics and EUV interactions, Prof. Alan Michette; (2) EUV optical systems, Prof. Ladislav Pina; and (3) Laser plasma EUV source based on a gas puff target, Prof. Henryk Fiedorowicz. Copies of the presentations have been published on CD and distributed to the school participants. After his lecture Prof. Michette provided a set of problems to test the students' understanding. A prize (a copy of the book Principles of Plasma Diagnostics, by IH Hutchinson), offered for the best set of answers, was won by Veronika Pickova of the Czech Technical University.

The laboratory training was carried out in the EUV laboratories, using two experimental setups equipped with laser plasma EUV sources, and in the microscopy laboratory equipped with a scanning electron microscope. The subjects of the laboratory training were: (1) Laser plasma EUV source based on a gas puff target, (2) Optical systems for EUV beam shaping (grazing incidence axisymmetrical ellipsoidal mirror, grazing incidence multifoil mirror, ellipsoidal mirror with Mo/Si coating), and (3) Scanning electron microscopy of the EUV irradiated samples. The laboratory training was provided under the supervision of experienced specialists from the host laboratory; Dr. Andrzej Bartnik, Dr. Rafał Rakowski, Dr. Mirosław Szczurek, and Dr. Jerzy Kostecki.

The students were split into three groups and each group spent approximately 90 minutes on each of the specific subjects. As a result of the training the students became familiar with the new technique of generation of EUV light using a laser-irradiated gas puff approach, with measurement techniques that are used for characterization of laser plasma EUV sources, with various optical systems for focusing EUV beam, and with a new method of processing organic polymers using EUV light.



Alan Michette (MC Chair)



Henryk Fiedorowicz (Local Organizer)