EUROMECH Final Report

EUROPEAN MECHANICS SOCIETY

Please send this report to the Secretary-General of EUROMECH, within one month after the Colloquium.

EUROMECH Colloquium No: 363

Title: "Mechanics of Laser Ablation"

Dates and location: June 23 - 26, 1997, Institute of Thermophysics SB RAS, Novosibirsk, Russia

Chairman: Academician V.E.Nakoryakov, Institute of Thermophysics SB RAS, Novosibirsk, Russia

Co-Chairman: Dr. W.Marine, Université de Aux-Marseille II, France and Dr. M.R.Predtechensky, Institute of Thermophysics SB RAS

Is there need of another Colloquium on the same or a related subject? Which year? Yes, in 2002

Full registration fee: 120 USD + 60 DM

What other funding was obtained? RFBR Grant of 25 million rubbles which allowed to keep low registration fee for the foreign participants and to reduce it to a minimum for the participants from Russia and Romania

What were the participants offered? Local transportation, Book of Abstracts, printed Colloquium program, excursions, lunches, breaks, Colloquium party

Number of members of EUROMECH (reduced registration fee): 3 (all from Russia)

Number of non-members of EUROMECH (full registration fee): 24, but for 14 of them (from Russia and Romania) EUROMECH addition was waved (the corresponding letter from Prof. Müller, Treasure of EUROMECH, is enclosed)

Number of participants from each country:

Austria		Germany	5	Romania	1
Belgium		Great Britain		Russia	16
Byelorussia		Greece		Slovakia	
Bosnia		Hungary		Slovenia	
Bulgaria		Ireland		Spain	
Croatia		Italy		Sweden	
Czech Republic		Latvia		Switzerland	
Denmark		Lithuania		Ukraine	
Estonia		Netherlands		Yugoslavia	
Finland		Norway		Others	
France	4	Poland			
Georgia		Portugal	1	Total	

Please turn

Scientific Report

The EUROMECH Colloquium 363 "Mechanics of laser ablation" was held in Novosibirsk Academgorodok, Russia, on June 23-26, 1997. The main aims of the Colloquium were as follows:
1. To bring to the attention of the researchers concerning with fundamental gas and fluid mechanics the related aspects of pulsed laser ablation (PLA);
2. To present the result of Siberian science to the attention of the European specialists.

Scientific activities of the Colloquium were divided into six sessions:
1. Opening section
2. Modelling and Diagnostics of Laser Plasma Expansion - I
3. Modelling and Diagnostics of Laser Plasma Expansion - II
4. Fundamental of Laser - Matter Interaction - I
5. Fundamental of Laser - Matter Interaction - II
6. Laser Ablation Deposition

30 papers were presented in all.

In the Opening session the extended lecture by Academician Director Dr. E. W. Kreutz (Lehrstuhl für Lasertechnik der RWTH, Aahen, Germany) "Dynamics in Pulsed Laser Deposition of Ceramics: Experimental, Theoretical and Numerical Studies" was heard. In the lecture Dr. Kreutz presented very impressive results of his scientific group and gave the detailed overview of the PLA problems which have to be solved in the nearest future. Co-chairman of the Colloquium Dr. M. R. Predtechensky told about the investigations performed in the Department of Physics of Molecular Structures of the Institute of Thermophysics SB RAS. The Colloquium participants were offered by the excursions to the related laboratories of the Institute of Thermophysics, the Institute of Nuclear Physics and the Institute of Laser Physics.

First two days were mainly dedicated to the mechanics of laser plume. Both experimental and theoretical studies were presented in two sessions. Different approaches to getting information about PLA plume parameters (time- and space-resolved emission, laser induced fluorescence spectroscopy, microwave radar method, etc.) were described in the papers came from leading groups in France, Germany and Russia. Of particular value is a new method of probe measurements of plasma induced magnetic field developed by the group of Marseille University in co-operation with the General Physics Institute of RAS, Moscow. It was first presentation of this method and it was discussed with great interest in the Colloquium. In the sessions, the numerical modellings of PLA plume were presented. The approaches developed in the Institute of Thermophysics (Novosibirsk, Russia) and in the University of Stuttgart (Germany) were accepted to be best matched to the problem. Colloquium attracted the attention of two groups which traditionally were engaged in Monte Carlo modelling of gas flows. These groups gave notices of preliminary results of recently-started studies of laser ablation processes which seem to be very promising.

In the sessions devoted to the mechanics of laser - matter interaction, the mechanisms of laser ablation initiation and the questions of solid surface processing were discussed. The different approaches to modelling of surface evaporation were presented: classical approach well supported by experimental investigations (Institute of Thermophysics SB RAS, Novosibirsk, Russia) and mesoscopic approach which had a great potential for laser ablation studies (Universidade do Minho, Braga, Portugal). Among experimental papers, the most attention were fixed to the works came from Max-Born-Institut für

Nichtlineare Optic und Kurzzeitspektroskopie (Berlin, Germany) and Institute for Atomic Physics (Bucharest, Romania). In the session dedicated to mechanics of laser ablation deposition, mainly the works by Siberian groups (Omsk Polytechnic University, the Institute of Thermophysics SB RAS and the Institute of Solid State Chemistry SB RAS from Novosibirsk) were presented.

In the closing discussion there were underlined that the processes near deposited substrate are the least understood aspects of the mechanics of laser ablation deposition. Another poorly known process is the correlation between laser plume gasdymamics and the chemical reactions in the plume. In the closing ceremony three fellowships (200 DM each) were given to young scientists who contributed the most interesting presentations to the Colloquium program. The fellowships were given to:

1. T. E. Itina (Laboratoire Interdisciplinaire Ablation Laser et Applications, Marseille, France) for the presentation "The effects of nonequilibrium chemical reactions during pulsed laser ablation in vacuum and into diluted ambient gas: Monte Carlo simulation" co-authored with W.Marine and M.Autric.

2. O. M. Tukhto (Institute of Thermophysics SB RAS, Novosibirsk, Russia) for the presentations "Pulsed laser deposition of Tl-containing multicomponent oxide films in Tl_2O vapor" co-authored with M.R.Predtechensky and "Preparation of HTSC films by laser deposition" co-authored with M.R.Predtechensky and K.N.Kolmakov.

3. O.F.Bobrenok (Institute of Thermophysics SB RAS, Novosibirsk, Russia) for the presentation "Effect of deposition conditions on visible photolumenescence of silicon films obtained by laser ablation" co-authored with M.R.Predtechensky and A.V.Bulgakov.

By different reasons the travelling of a five non-Russian scientists to Novosibirsk failed just before the Colloquium but there was great interest to the meeting. The Organizing Committee received a number of letters with the request to repeat the Colloquium in due course. Unanimous opinion of the Colloquium participants was to call the researches investigating the laser ablation processes together again after 4 - 5 years.

Co-Chairman
Dr. M. R. Predtechensky

N. Bulgakova
Scientific Secretary
Dr. N. M. Bulgakova