

**THE EIGHTH YUGOSLAV MATERIALS  
RESEARCH SOCIETY CONFERENCE**

# **YUCOMAT 2006**

**Programme  
and  
The Book of Abstracts**

**HERCEG NOVI,  
September 4-8, 2006**

Organized by:  
YUGOSLAV MATERIALS RESEARCH SOCIETY  
and  
INSTITUTE OF TECHNICAL SCIENCES OF SASA

<http://www.yu-mrs.org.yu>

**Title:** THE EIGHTH YUGOSLAV MATERIALS RESEARCH SOCIETY  
CONFERENCE

“YUCOMAT 2006”  
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**Publisher:** Institute of Technical Sciences of SASA  
Knez Mihailova 35/IV; P.O. Box 377, 11000 Belgrade  
Phone: +381 11 185-437; Fax: +381 11 185-263

**Editor:** Prof. Dr. Dragan P. Uskoković

**Technical editor:** Aleksandra Stojičić

**Cover page:** Aleksandra Stojičić

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**Acknowledgment:** The editor of the book of abstracts is grateful to the Ministry of Sciences and Environmental Protection of Republic of Serbia for its financial support of this book and The Eighth Yugoslav Materials Research Society Conference “YUCOMAT 2006” held in Herceg Novi.

**Printed in:** Printing office “Čigoja”  
Studentski trg 15, 11000 Belgrade  
Phones: +381 11 186-725; +381 11 625-954  
Circulation: 250 copies. The end of printing: July 2006.

P.S.B.36

**LASER BEAM INDUCED STRUCTURAL CHANGES IN MULTICOMPONENT  
NICKEL ALLOYS**

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Multicomponent nickel alloy, alloyed with: Mn, Cr, Al, Fe, B, Zr and others, was subjected after mechanical under the vacuum heat treatments: solution heat treatment at 1080°C for 1 hour, primary precipitation at 840°C for 4 hours, secondary precipitation heat treatment at 760°C for 3 hours and stress relief annealing at 700°C for 1 hour. After heat treatments, laser surface treatment was applied and was related to the material deformation and damage formation on the material surface.

Preliminary investigations were carried out by laser drilling and resulting traces on material were recorded by scanning electron microscope to find out the influence of different energies and pulse length on structural changes in the material.

P.S.B.37

**FINE-STRUCTURAL INVESTIGATIONS OF NICKEL BASED  
SUPERALLOYS AFTER VARIOUS HEAT TREATMENTS**

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Investigations were carried out on nickel based superalloy Hastelloy S after applied thermomechanical treatments. The main aim of applied heat treatments was microstructural changing to obtain material that would, under the work conditions (high pressures and temperature), satisfied rigorous demands in view of high-temperature oxidation and corrosion, thermal strain, fatigue and creep resistance.

Besides mechanical, submicrostructural investigations were carried out, and showed presence of  $\gamma$  solid solution and several complex phases:  $\gamma'$  intermetallic compound, TCP phases (sigma, Laves,  $\eta$  etc), carbides, nitrides, borides and others. These phases have directly influenced material properties, and their identification by contemporary techniques contributed to the choice of adequate heat treatment regime. In this paper was shown a diffusion-interfacial mathematical model that using Cahn-Hilliard equation satisfactorily describes coarsening and phase-separation kinetics.