MATERIALS RESEARCH SOCIETY OF SERBIA
INSTITUTE OF TECHNICAL SCIENCES OF SASA

Programme and the Book of Abstracts

EIGHTEENTH YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING

Belgrade, December 4–6, 2019

http://www.mrs-serbia.org.rs/index.php/young-researchers-conference

EIGHTEENTH YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING

December 4-6, 2019, Belgrade, Serbia

Program and the Book of Abstracts

Materials Research Society of Serbia
&
Institute of Technical Sciences of SASA

November 2019, Belgrade, Serbia

Book title:
Eighteenth Young Researchers' Conference - Materials Science and Engineering:
Program and the Book of Abstracts

Publisher:
Institute of Technical Sciences of SASA
Knez Mihailova 35/IV, 11000 Belgrade, Serbia
Tel: +381-11-2636994, 2185263, http://www.itn.sanu.ac.rs

Editor:
Dr. Smilja Marković

Technical Editor:
Aleksandra Stojičić

Cover page: Aleksandra Stojičić and Milica Ševkušić
Cover: Modified Photo by Miloš Stošić; Wikimedia Commons
(https://commons.wikimedia.org/wiki/File:Бедеми_-_поглед_на_Ушће.jpg); Creative
Commons Attribution-Share Alike 3.0 Unported license

Printer:
Gama digital centar
Autoput No. 6, 11070 Belgrade, Serbia
Tel: +381-11-6306992, 6306962
http://www.gdc.rs

Edition:
130 copies

CIP - Каталогизација у публикацији

Народна библиотека Србије, Београд

66.017/.018(048)

YOUNG Researchers Conference Materials Sciences and Engineering (18 ; 2019 ; Beograd)
Program ; and the Book of abstracts / Eighteenth Young Researchers' Conference Materials Sciences and Engineering, December 4-6, 2019, Belgrade, Serbia ; [organized by] Materials Research Society of Serbia & Institute of Technical Sciences of SASA ; [editor Smilja Marković]. - Belgrade : Institute of Technical Sciences of SASA, 2019 (Belgrade : Gama digital centar). - XX, 102 str. : ilustr. ; 23 cm

Tiraž 130. - Registar.

ISBN 978-86-80321-35-6 (ITSSASA)

а) Наука о материјалима -- Апстракти б) Технички материјали – Апстракти

COBISS.SR-ID 281006348

5-4

Modeling of the optical gain in ZnO-based quantum cascade lasers

Aleksandar Atić, Jelena Radovanović, Vitomir Milanović
School of Electrical Engineering, University of Belgrade, Serbia

ZnO has been proposed recently as a good base material for high-power terahertz quantum cascade lasers (QCLs) operating at room temperature. We have developed a theoretical model for calculation of the optical gain, based on solving the system of rate equations and taking into account relevant scattering mechanisms. This model has been implemented to perform numerical simulations using ZnO/ZnMgO material combination, starting from the conventional design with three well within the active region of the structure. The influence of the layer widths and composition on the output properties has been considered, together with the variation of the number of quantum wells per QCL period.

5-5

Numerical modeling of the deformation of steel X52 pipeline wall under pressurized gas flow effect: one way coupling approach of fluid-structure interaction

Zahreddine Hafsi
Laboratory of Applied Fluids Mechanics Process and Environment Engineering, National Engineering School of Sfax, University of Sfax, Sfax 3038, Tunisia

API X52 steel grade is a widely used material for pipelines dedicated to gas transport in large scale networks. Assessment of the capability of the pipeline material to maintain its integrity under the internal load of pressurized gas mainly during transient pressure fluctuations is a major concern for engineers and designers. The present work is devoted to numerically model the behavior of X52 steel pipeline wall carrying natural gas under pressure. The numerical model is built through a one way coupling approach of the interaction between the gas flow and the material behavior. Partial differential equations describing steady and transient gas flow are numerically solved. Then, obtained pressure variations are taken as a boundary load on the internal X52 pipe wall and thus displacement equation describing pipe structure deformation is numerically solved. To describe the material behavior, two techniques were used to obtain the transient pipe displacement field. For the first technique, the displacement equation is solved for the transient case considering the time dependent boundary load resulted from the transient gas pressure. The second way to obtain the displacement field is to solve the displacement equation considering a stationary case with a formal time dependencies. Indeed, a sweep method over a parameter “*t*” that stands for time is used to solve a set of stationary forms of the displacement equation. The effectiveness of both techniques was discussed. The reliability of the numerical model is proved through comparison of obtained steady state pipe wall deformation with the analytical solution of the internally pressurized cylinder problem.