

Zorana Arsenijević

Naučni savetnik

Centar za katalizu i hemijsko inženjerstvo

Adresa: Centar za katalizu i hemijsko inženjerstvo - Sektor za hemijsko inženjerstvo, Univerzitet u Beogradu, Institut za hemiju, tehnologiju i metalurgiju, Institut od nacionalnog značaja za Republiku Srbiju, Njegoševa 12, 11000 Beograd, Srbija
Laboratorije: Tehnološko metalurški fakultet, Karnegijeva 4, I sprat, Pilot plant, 11120 Beograd 35, Pak 135804, Srbija

Telefon: +381 11 3370408

Faks: +381 11 3370500

Elektronska pošta: zorana.arsenijevic@ihtm.bg.ac.rs

Datum i mesto rođenja: 1971 Beograd, Srbija

Obrazovanje: 2006 doktor tehničkih nauka - oblast hemija i hemijska tehnologija (Tehnološko metalurški fakultet)

Naučno zvanje: 2015 naučni savetnik – Univerzitet u Beogradu, Institut za hemiju, tehnologiju i metalurgiju, Institut od nacionalnog značaja za Republiku Srbiju

Članstva u društvima: Savez hemijskih inženjera Srbije, Srpsko hemijsko društvo

Profesionalno iskustvo: 1995 - danas Centar za katalizu i hemijsko inženjerstvo - Sektor za hemijsko inženjerstvo, Univerzitet u Beogradu, Institut za hemiju, tehnologiju i metalurgiju, Institut od nacionalnog značaja za Republiku Srbiju

Nagrade i priznanja: Najbolja tehnološka inovacija 2017. god., osvojeno 5. mesto 21.12.2017. (High Efficiency Disperse Dryer - an innovative process for drying of solutions, suspensions and pastes in a fluidized bed of inert particles), Tim Fluid plus: Mihal Đuriš, Zorana Arsenijević, Tatjana Kaluđerović Radoičić, Darko Jačimovski (IHTM-TMF)

- Research Interests:**
- Fenomeni prenosa i hemijske reakcije u višefaznim sistemima fluid-čestice;
 - Interakcije gasova, tečnosti i čvrstih čestica u fluidizovanim, fontanskim i modifikovanim fontanskim slojevima;
 - Sušenje organskih i neorganskih rastvora/suspenzija/pasta u sistemima sa inertnim česticama;
 - Integrisani procesi i multifunkcionalni uređaji za povećanje produktivnosti i energetske efikasnosti u različitim oblastima, prvenstveno za prečišćavanje otpadnih gasova/voda i tretman različitog tečnog i čvrstog otpada;
 - Razvoj i uvećanje razmera procesa u multifunkcionalnim kontaktorima/reaktorima

Profesionalna dostignuća: Koautor u izradi 6 tehničkih rešenja recenziranih od strane dva recenzenta-eksperta iz oblasti tehničkog rešenja.

1. Grbavčić Ž., Arsenijević Z., Grbić B., Garić-Grulović R., Radić N., Pejanović S., Bošković-Vragolović N., Postrojenje za termički tretman tečnog otpada fabrike pesticida, novo eksperimentalno postrojenje (pilot-demonstraciono postrojenje). Novo eksperimentalno postrojenje urađeno u okviru inovacionog projekta 411-00-00144/2008-01-IP Tip 1./42, za korisnika istraživanja: preduzeće Galenika-Fitofarmacija a.d.-Beograd, (2009).
2. Grbavčić Ž., Grbić B., Arsenijević Z., Radić N., Garić-Grulović R., Pejanović S., Bošković-Vragolović N., Postrojenje za formulaciju nove grupe herbicida na bazi izopropilamina sa sistemom za eliminaciju emisije štetnih gasova i čestica u radnu i životnu sredinu, bitno poboljšan tehnološki postupak. Poboljšanje tehnologije na industrijskom nivou urađeno u okviru inovacionog projekta 401-00-218/2007-01/46, za korisnika istraživanja: preduzeće Galenika-Fitofarmacija a.d.-Beograd, (2008).
3. Grbavčić Ž., Arsenijević Z., Grbić B., Garić-Grulović R., Radić N., Pejanović S., Bošković-Vragolović N., Postrojenje za uklanjanje dihlubenila iz emisionih gasova, industrijski prototip. Industrijsko postrojenje urađeno u okviru inovacionog projekta 401-00-218/2007-01/45, za korisnika istraživanja: preduzeće Galenika-Fitofarmacija a.d.-Beograd, (2008).
4. Grbavčić Ž., Arsenijević Z., Grbić B., Radić N., Garić-Grulović R., Pejanović S., Postrojenje za uklanjanje organskih para u radnoj sredini i emisionim gasovima, industrijski prototip. Industrijsko postrojenje urađeno u okviru inovacionog projekta PTR-8071B, za korisnika istraživanja: preduzeće Galenika-Fitofarmacija a.d.-Beograd, (2007).
5. Grbavčić Ž., Grbić B., Arsenijević Z., Radić N., Garić-Grulović R., Pejanović S., Postrojenje za uklanjanje dimetil amina iz emisionih gasova, industrijski prototip. Industrijsko postrojenje urađeno u okviru inovacionog projekta PTR-2115B, za korisnika istraživanja: preduzeće Galenika-Fitofarmacija a.d.-Beograd, (2006).
6. Postrojenje za sušenje suspenzija i pasta u fluidizovanom sloju inertnog materijala kapaciteta 650 kg/h, industrijski prototip, Nesting-TMF-IHTM. Realizovano u HI "ŽUPA"-Kruševac, (2003). godine; rezultat NI projekata ON-02E08, ON-101700 i I.5.1827

Citati: 251 (bez autocitata), 21.12.2021.god.; h index = 10

Znanje jezika: Srpski (maternji), Engleski

Najznačajniji Međunarodni:

- projekti:** **2007-2009** Projekat međunarodne saradnje IRC Galenika Fitofarmacija-TMF-IHTM sa Evropskom Agencijom za rekonstrukciju (EAR) i Evropskom bankom za rekonstrukciju i razvoj (EBRD) u okviru TAM (Turn Around Management) programa, po Ugovoru BD ref. 5209/2007. Naziv projekta: „Comprehensive (All in) Innovative solution for Pesticide Formulating, Packaging and Repackaging Wastewater Treatment” (saradnik)
- 2008-2010** Projekt bilateralne saradnje sa Bugarskom (IONH - BAN), Naziv projekta: “Nanostrukturni termostabilni katalitički sistemi sa niskim hidrodinamičkim otporom za prečišćavanje otpadnih gasova” (saradnik)
- 2011-2013** Produžena bilateralna saradnja sa Bugarskom (IONH - BAN), Naziv projekta: Nanostrukturni termostabilni katalitički sistemi sa niskim hidrodinamičkim otporom za prečišćavanje otpadnih gasova (saradnik).
- 2014-2017** Projekat bilateralne saradnje sa Bugarskom (BAS - IHTM), Naziv projekta: Development of advanced catalytic systems applicable to chemical and photochemical processes for neutralization of environmental pollutions (saradnik).
- 2017-2020** Projekat bilateralne saradnje sa Bugarskom: Naziv projekta: Heterogeneous catalytic and photocatalytic destruction of organic and pharmaceutical contaminants in the nature by multicomponent systems (saradnik)
- 2020-2022** Projekat bilateralne saradnje sa Bugarskom (SASA-BAS Project): Naziv projekta: Mono- and poly-component catalytic systems for waste water and polluted air purification from model contaminants (Mono- i poli-komponentni katalitički sistemi za prečišćavanje otpadnih voda i zagađenog vazduha od modelnih kontaminanata) (saradnik)
- 2018-2021** “Further Implementation of the Industrial Emission Directive in Serbia” <https://www.iedserbia.org/>, (DSIP Technical Expert, (2018); Activity 2.2 – Preparation of a Manual on by-products management, (2019); Activity 2.3 Local STE – IPPC/IED Permit Expert, (okt 2018-jan 2021)) (saradnik)

Nacionalni:

Osnovna istraživanja

- 1996-2000** Fenomeni prenosa u višefaznim sistemima, projekat 02E08, Pp2: Fenomeni prenosa u višefaznim sistemima fluid-čestice, MNT RS, (saradnik)
- 2001-2005** Istraživanje fenomena prenosa relevantnih za razvoj procesa i opreme u oblasti kontaktora fluid-čestice i separacionih procesa, projekat 1700, MNTR RS, (saradnik)
- 2006-2010** Istraživanje fenomena prenosa relevantnih za razvoj višefaznih procesa i opreme, projekat 142014G, MNTR RS, (saradnik)
- 2011-2016** Razvoj efikasnijih hemijsko-inženjerskih procesa zasnovan na istraživanjima fenomena prenosa i principima intenzifikacije procesa, projekat 172022, MNTR RS (saradnik)

Primenjena istraživanja:

- 1998-1999** Razvoj postupka i poluindustrijskog postrojenja za sušenje suspenzija u fluidizovanom sloju inertnog materijala, Inovacioni projekat I5.1827, MNTR RS, (saradnik)
- 2001-2002** Projekat poluindustrijskog-demonstracionog postrojenja za uklanjanje etilen oksida iz emisionih gasova katalitičkim sagorevanjem, projekat rađen za Ministarstvo zdravlja RS - Uprava za zaštitu životne okoline, TMF-IHTM, (saradnik)
- 2005-2006** Razvoj postupka i industrijskog prototipa za prečišćavanje dimetil amina u emisionim gasovima, Inovacioni projekat PTR-2115B, TMF-IHTM-GALENIKA FITOFARMACIJA-MNZŽS RS, (saradnik)
- 2006-2007** Razvoj postupka i industrijskog prototipa za uklanjanje organskih para u radnoj sredini i emisionim gasovima, Inovacioni projekat PTR-8071B, TMF-IHTM-MNZŽS RS, (saradnik)
- 2007-2008** Formulacija nove grupe herbicida na bazi izopropilamina – razvoj postupka u zatvorenom sistemu i eliminacija emisije štetnih gasova i čestica u radnu i životnu sredinu, Inovacioni projekat 401-00-218/2007-01/46, IRC GALENIKA FITOFARMACIJA-TMF-IHTM-NESTING-MN RS, (saradnik)
- 2007-2008** Razvoj tehnologije i industrijskog prototipa za uklanjanje dihalobenila iz emisionih gasova, Inovacioni projekat 401-00-218/2007-01/45, IRC GALENIKA FITOFARMACIJA-TMF-IHTM-NESTING-MN RS, (saradnik)
- 2008-2009** Razvoj postupka i izgradnja pilot postrojenja za tretman tečnog otpada fabrike pesticida, Inovacioni projekat 411-00-00144/2008-01-IP Tip 1./42, IRC GALENIKA FITOFARMACIJA-TMF-IHTM-NESTING-MN RS, (saradnik)
- 2017-2018** Razvoj tehnologije i izgradnja laboratorijskog uređaja za granulaciju praškastih preparata za zaštitu bilja, Inovacioni projekat br. 16-10, Inovacioni centar Tehnološko-Metalurškog fakulteta u Beogradu registrovan kao Inovacioni centar - subjekt inovacione delatnosti pod brojem RID 77/09 (saradnik)

Izabrane Monografije, poglavlja u knjigama

- publikacije:**
- Arsenijević, Z.**, Sušenje suspenzija u industriji, 1. izdanje, izdavač: Zadužbina Andrejević, Biblioteka Dissertatio, str. 1-100, tiraž: 500, ISSN 0354-7671, Beograd, novembar 2008
 - Patrick Lawrence Sweeney, Aleksandra Ivetić, Tatjana Kaluđerović Radoičić, Ivona Radović, **Zorana Arsenijević**, Upravljanje sporednim proizvodima u prehrambenoj industriji, Priručnik je pripremljen u okviru projekta „Implementacija Direktive o industrijskim emisijama u Srbiji” koji sprovodi Centar za čistiju proizvodnju Tehnološko – metalurškog fakulteta Univerziteta u Beogradu i finansira Švedska agencija za međunarodni razvoj i saradnju, Beograd, mart 2020.

Publikovani radovi:

- Đuriš M, **Arsenijević Z**, Kaluđerović Radoičić T, Sensitivity Analysis of the Variational Model for the Particulate Expansion of Fluidized Beds, Particulate Science and Technology, 38 (1) (2020), 95 - 104
- Đuriš M, **Arsenijević Z**, Garić-Grušević R, Kaluđerović Radoičić T, Prediction of interphase drag coefficient and bed expansion using a variational model for fluidization of small spherical particles, Particuology, 51 (2020) 184-192.
- Đuriš M, **Arsenijević Z**, Jaćimovski D, Kaluđerović Radoičić T, Optimal pixel resolution for sand particles size and shape analysis, Powder Technology, 302 (2016) 177-186
- Đuriš M, Kaluđerović Radoičić T, Jaćimovski D, **Arsenijević Z**, High Efficiency Disperse Dryer - an innovative process for drying of solutions, suspensions and pastes in a fluidized bed of inert particles, Hemijska industrija, 73(4) (2019) 213 - 222
- Đuriš M, Kaluđerović Radoičić T, **Arsenijević Z**, Garić-Grušević R, Grbavčić Ž, Prediction of bed expansion of polydisperse quartz sand mixtures fluidized with water, Powder Technology, 289 (2016) 95–103
- Arsenijević Z**, Kaluđerović-Radoičić T, Đuriš M, Grbavčić Ž, Experimental investigation of heat transfer in three phase

- fluidized bed cooling column, Chem. Ind. Chem. Eng. Q., 21 (2015), 519-526
7. Pešić R., Kaluđerović-Radoičić T., Bošković-Vragolović N, **Arsenijević Z**, Grbavčić Ž, Pressure Drop in Packed Beds of Spherical Particles at Ambient and Elevated Air Temperatures, Chem. Ind. Chem. Eng. Q., 21 (2015), 419-427
 8. Pešić R., Kaluđerović-Radoičić T., Bošković-Vragolović N., **Arsenijević Z.**, Grbavčić Ž., Heat transfer between a packed bed and a larger immersed spherical particle, International Journal of Heat and Mass Transfer, 78 (2014) 130-136
 9. **Arsenijević Z**, Kaluđerović Radoičić T, Garić-Grulović R, Đuriš M, Grbavčić Ž, Hydrodynamic modeling of downward gas-solids flow. Part II: Co-current flow, Powder Technology, 256 (2014) 416–427
 10. Garić-Grulović R, Kaluđerović Radoičić T, **Arsenijević Z**, Đuriš M, Grbavčić Ž, Hydrodynamic modeling of downward gas-solids flow. Part I: Counter-current flow, Powder Technology, 256 (2014) 404–415
 11. Kaluđerović Radoičić T, Đuriš M, Garić-Grulović R, **Arsenijević Z**, Grbavčić Ž, Particle characterization of polydisperse quartz filtration sand, Powder Technology, 254 (2014) 63–71
 12. Kaluđerović Radoičić T, Đuriš M, Garić-Grulović R, **Arsenijević Z**, Željko Grbavčić, Solid circulation rate and particle collisions in quasi two-dimensional water fluidized beds of spherical particles, Powder Technology, 253 (2014) 295–303
 13. Đuriš M, Kaluđerović Radoičić T, Garić-Grulović R, **Arsenijević Z**, Grbavčić Ž, Particle velocities in quasi two-dimensional water fluidized beds of spherical particles, Powder Technology, 246 (2013) 98-107
 14. Đuriš M, Garić-Grulović R, **Arsenijević Z**, Jačimovski D, Grbavčić Ž, Segregation in water fluidized beds of sand particles, Powder Technology, 235 (2013) 173–179
 15. **Arsenijević ZLj**, Grbavčić ŽB, Grbić BV, Radić ND, Garić-Grulović RV, Đuriš MM. Removal of Ethylene Oxide from Waste Gases by Absorption. Hemijska industrija 2011; 65(4):389-395.
 16. **Arsenijević Z**, Grbavčić ŽB, Garić-Grulović RV, Bošković-Vragolović NM. Wall effects on the velocities of a single sphere settling in a stagnant and counter-current fluid and rising in a co-current fluid. Powder Technol 2010;203(2):237-42.
 17. **Arsenijević Z**, Grbavčić Z, Grbić B, Radić N, Garić-Grulović R, Miletić S, Savčić G, Dordević B. Fluidized bed combustion of pesticide-manufacture liquid wastes. Journal of the Serbian Chemical Society 2010;75(4):523-35.
 18. **Arsenijević ZL**, Grbić BV, Radić ND, Garić-Grulović RV, Grbavčić ZB. Ethylene oxide removal by sorption on aluminium oxide. Hemijska Industrija 2009;63(4):337-43.
 19. Grbić B, Radić N, **Arsenijević Z**, Garić-Grulović R, Grbavčić Z. Structure sensitivity of dimethylamine deep oxidation over Pt/Al₂O₃ catalysts. Applied Catalysis B: Environmental 2009;90(3-4):478-84.
 20. Grbavčić ŽB, **Arsenijević ZL**, Garić-Grulović RV. Prediction of single particle settling velocities through liquid fluidized beds. Powder Technol 2009;190(3):283-91.
 21. **Arsenijević Z**, Savčić G, Ranković D, Grbić B, Radić N, Garić-Grulović R, Grbavčić Z. Low concentration volatile organic pollutants removal in combined adsorber-desorber-catalytic reactor system. Hemijska Industrija 2008;62(2):51-8.
 22. **Arsenijević ZLj**, Grbavčić ZB, Garić-Grulović RV. Performances of continuous dryer with inert medium fluidized bed. Hemijska Industrija 2008;62(1):13-24.
 23. **Arsenijević Z**, Grbić B, Grbavčić Z, Miletić S, Savčić G, Radić N, Garić-Grulović R. Prevention and control of dimethylamine vapors emission: Herbicide production plant. Chem. Ind. Chem. Eng. Q. 2008;14(4):239-43.
 24. Ranković D, **Arsenijević Z**, Radić N, Grbić B, Grbavčić Ž. Removal of volatile organic compounds from activated carbon by thermal desorption and catalytic combustion. Russian Journal of Physical Chemistry A 2007;81(9):1388-91.
 25. **Arsenijević ZL**, Grbavčić ŽB, Garić-Grulović RV. Prediction of the particle circulation rate in a draft tube spouted bed suspension dryer. Journal of the Serbian Chemical Society 2006;71(4):401-12.
 26. **Arsenijević ZL**, Grbić BV, Radić ND, Grbavčić ZB. Catalytic incineration of ethylene oxide in the packed bed reactor. Chem Eng J 2006;116(3):173-8.
 27. Grbavčić ŽB, Garić-Grulović RV, **Arsenijević ZL**. Prediction of the choking velocity and voidage in vertical pneumatic conveying of coarse particles. Powder Technol 2006;161(1):1-9.
 28. Garić-Grulović R, Grbavčić Ž, **Arsenijević Z**. A pseudo-fluid representation of vertical liquid-coarse solids flow. Journal of the Serbian Chemical Society 2005;70(5):775-84.
 29. Grbavčić ZB, **Arsenijević ZL**, Garić-Grulović RV. Drying of slurries in fluidized bed of inert particles. Drying Technol 2004;22(8):1793-812.
 30. Garić-Grulović RV, Grbavčić ŽB, **Arsenijević ZL**. Heat transfer and flow pattern in vertical liquid-solids flow. Powder Technol 2004;145(3):163-71.

Saopštenja

1. Joksimovic K, Zivanovic R, Djuris M, **Arsenijević Z**, Kaludjerovic Radojicic T, Optimization of Wet Fluidized Bed Granulation Process, Proceedings of the International Congress on Process Engineering – Processing, Union of Mechanical and Electrotechnical Engineers and Technicians of Serbia (SMEITS) Society for Process Engineering, vol. 30, no. 1, pp. 417 - 424, Belgrade, 1. - 2. Jun, 2017
2. Kaluđerović Radoičić T, Đuriš M, **Arsenijević Z**, Drying of Suspensions and Solutions in Fluidized Bed of Inert Particles – Material Hold-Up And Energy Efficiency Study, IX International Conference Industrial Engineering and Environmental Protection (IIZS 2019), Zrenjanin, Serbia, 3 - 4 October, (2019), pp. 23 - 30
3. Đuriš M, Kaluđerović Radoičić T, **Arsenijević Z**, Material hold-up and residence time in fluidized bed of inert particles slurry dryer, International Mineral Processing and Recycling Conference, Belgrade, Serbia, 8 - 10 May, (2019), pp. 357 - 364
4. Đuriš M, Kaluđerović Radoičić T, Jačimovski D, **Arsenijević Z**, Drying of CuSO₄ Solutions in a Fluidized Bed of Inert Material, 19th Conference on Thermal Science and Engineering of Serbia, Sokobanja, Serbia, 22. - 25. Oct, 2019, pp. 410 - 419
5. **Arsenijević Z.**, Grbavčić Z., Grbić B., Radić N., Garić-Grulović R., Djuris M., Pesticide Manufacturing Liquid Waste Combustion in a Fluidized Bed of Inert Particles, ASME-ATI-UIT 2010 Conference on Thermal and Environmental Issues in Energy Systems 16 – 19 May, 2010, Sorrento, Italy
6. Radić N., Grbić B., **Arsenijević Z.**, Garić-Grulović R.V., Grbavčić Ž., Kinetics of Deep Oxidation of Dimethylamine over Pt/Al₂O₃ Catalysts, Proceedings of the 9th International Conference on Fundamental and Applied Aspects of Physical Chemistry, Belgrade, Serbia, 26-29 September, (2008), pp.157-159 (poster C-8-P).
7. **Arsenijević Z.Lj.**, Grbavčić Ž.B., Garić-Grulović R.V., Modelling of suspension drying on inert particles in the draft tube

spouted bed, 15th International Drying Symposium, Proceedings, ISBN 963-9483-59-1, Budapest, Hungary, August 20-23, Vol A, (2006), pp. 407-414.

8. **Arsenijević Z.Lj.**, Grbavčić Ž.B., Garić-Grulović R.V., The Material Hold-up and Residence Time in Fluidized Bed of Inert Particles Slurry Dryer, 5th South East European Symposium on Research, Development and Implementation of New Energy Efficient and Ecologically Acceptable Technologies Applied to Energy Production, Chemical and Environmental Engineering, Proc., J.Hristov, ed., ISBN 954-9380-03-3, Sunny Beach, September 10-14, Bulgaria, (2005), pp. 83-94.
9. **Arsenijević Z.Lj.**, Grbavčić Ž.B., Garić-Grulović R.V., Drying of Solutions & Suspensions in the Modified Spouted Bed with Draft Tube, 4th South-East European Symposium on Fluidized Beds in Energy Production, Chemical and Process Engineering and Ecology, Proceeding of Lectures, Thessaloniki, Greece, April 3-4, (2003), pp. 65-72.
10. Grbavčić Ž.B., **Arsenijević Z.Lj.**, Garić-Grulović R.V., Drying of Slurries in Fluidized Bed of Inert Particles, 4th South-East European Symposium on Fluidized Beds in Energy Production, Chemical and Process Engineering and Ecology, Proceeding of Lectures, Thessaloniki, Greece, April 3-4, (2003), pp. 73-79.
11. Garić-Grulović R.V., **Arsenijević Z.Lj.**, Grbavčić Ž.B., Mass Transfer in Vertical Two-Phase Flow of Liquid Coarse Particles, 3rd South-East European Symposium on Fluidized Beds in Energy Production, Chemical and Process Engineering and Ecology, Proceeding of Lectures, Sinaia, Romania, September 25-29, (2001), pp. 23-31.
12. **Arsenijević Z.Lj.**, Povrenović D.S., Grbavčić Ž.B., Comparative Analyze of Drying Suspensions in the Fluidized Bed and Spout-Fluid Bed with Draft Tube, 3rd South-East European Symposium on Fluidized Beds in Energy Production, Chemical and Process Engineering and Ecology, Proceeding of Lectures, Sinaia, Romania, September 25-29, (2001), pp. 147-153.
13. Grbavčić Ž.B., **Arsenijević Z.Lj.**, Grbić B.V., Modeling and Simulation of Packed Bed Catalytic Reactor Using Computational Fluid Dynamics Software FLUENT, 3rd South-East European Symposium on Fluidized Beds in Energy Production, Chemical and Process Engineering and Ecology, Proceeding of Lectures, Sinaia, Romania, September 25-29, (2001), pp. 185-190.
14. Grbavčić Ž., **Arsenijević Z.**, Modelling and Simulation of Sorbent/Catalytic Reactor System Using Computational Fluid Dynamics Software-Fluent, Proceedings of the 1st Southeastern Europe Fluent Users Group Meeting, Greece, 20 October, (2000), pp. S5.40-S5.48.
15. **Arsenijević Z.Lj.**, Grbavčić Z.B., A fluidized bed drier for suspensions and pastes, International Thermal Science Seminar, Bled, Slovenia, June 11 – 14, 2000, Volume 1 - Thermal Sciences 2000, Proceedings of the International Thermal Science Seminar, ISSN 961-91393-0-5, (2000), pp. 489-496.