

A step félvezetőtechnológiai szimulációs program

Tarnay, K.; Drozdy, G.; Masszi, F.; **Rang, Toomas** Mérés és automatika: megjelenik a Méréstechnikai és Automatizálási Tudományos Egyesület Szerkesztésében 1981 / p. 460-464

A7 I²L kapu modellezése a TRAN-TRAN nemlineáris áramköalakalizós program segítségével

Rang, Toomas Híradástechnika = Journal on communications, computers, convergence, contents, companies 1980 / p. 216-220

Ambient temperature influence on current suppressing effect caused by self-heating phenomenon at 6H-SiC Schottky interfaces

Kurel, Raido; Rang, Toomas BEC'98 : the 6th Biennial Conference on Electronics and Microsystems Technology, October 7-9, 1998, Tallinn, Estonia : proceedings 1998 / p. 253-254: ill

An analysis of critical parameters of SiC JBS structures

Kurel, Raido; Rang, Toomas; Poirier, Laurent Proceedings of the Estonian Academy of Sciences. Engineering 2006 / 3-2, p. 284-299 : ill

Analog front end components for bio-impedance measurement : current source design and implementation = Bioimpedantsi mõõteseadme analoogosa komponendid : vooluallika disain ja realisatsioon

Kasemaa, Argo 2011 <https://digi.lib.ttu.ee/i/?590>

Analysis of barrier inhomogeneities of P-type Al/4H-SiC Schottky barrier diodes

Ziko, Mehadi Hasan; Koel, Ants; Rang, Toomas; Toompuu, Jana Silicon Carbide and Related Materials 2019 : Selected peer-reviewed papers from International Conference on Silicon Carbide and Related Materials 2019 (ICSCRM 2019), September 29 - October 4, 2019, Kyoto, Japan Materials science forum 2020 / p. 960-972 <https://doi.org/10.4028/www.scientific.net/MSF.1004.960>
[Conference proceedings at Scopus](#) [Article at Scopus](#)

Analysis of deep level centers in GaAs pin-diode structures

Korolkov, Oleg; Toompuu, Jana; Rang, Toomas Elektronika ir elektrotehnika = Electronics and electrical engineering 2013 / [4 p.] : ill <https://doi.org/10.5755/j01.eee.19.10.5903> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Analysis of deep level spectrum in GaAs p+-p-i-n-n+ structures

Toompuu, Jana; Sleptšuk, Natalja; Korolkov, Oleg; Rang, Toomas Materials characterization VII 2015 / p. 283-294 : ill

Analysis of peak current for current crowding effect in 4H- and 6H-SiC Schottky structures

Kurel, Raido; Rang, Toomas The 7th Biennial Conference on Electronics and Microsystem Technology "Baltic Electronics Conference" : BEC 2000 : October 8 - 11, 2000, Tallinn, Estonia : conference proceedings 2000 / p. 235-236 : ill

Analysis of the basic Schottky parameters for diffusion-welded aluminium contacts to p- and n-type SiC

Korolkov, Oleg; Ljutov, Jevgeni; Kuznetsova, Natalja; Ruut, Jana; **Rang, Toomas** BEC 2004 : proceedings of the 9th Biennial Baltic Electronics Conference : October 3-6, 2004, Tallinn, Estonia 2004 / p. 51-53 : ill

Andursignaalide töötlemine ja andursüsteemid : metoodiline juhend

1989 https://www.ester.ee/record=b1240066*est

Andursignaalide töötlemine ja andursüsteemid : metoodiline juhend

1988 https://www.ester.ee/record=b1239930*est

Application of power line communication technology in street lighting control

Farkas, Tekla D.; Kiraly, Tamás; **Pardy, Tamas; Rang, Toomas; Rang, Galina** International journal of design and nature and ecodynamics 2018 / p. 176-186 : ill <https://doi.org/10.2495/DNE-V13-N2-176-186> [Journal metrics at Scopus](#) [Article at Scopus](#) [Article at WOS](#)

Arukad põhjendused pole veel kedagi veennud : [TTÜ arengutest tulevikus]

Rang, Toomas Mente et Manu 2004 / 3. nov., lk. 2, 4 : fot https://www.ester.ee/record=b1242496*est

ASIC for alcohol sensor

Kasemaa, Argo; Rang, Toomas BEC'98 : the 6th Biennial Conference on Electronics and Microsystems Technology, October 7-9, 1998, Tallinn, Estonia : proceedings 1998 / p. 283-286: ill

Az I²L sztatikus zavar védettsége

Rang, Toomas Mérés és automatika: megjelenik a Méréstechnikai és Automatizálási Tudományos Egyesület Szerkesztésében 1980 / p. 466-468

Balti elektroonika konverents (BEC'96)

Rang, Toomas SAT-Meedia ja Elektroonika 1996 / 8, lk. 14-15: ill

Balti elektroonikakonverents 2002 : [TTÜ elektroonikainstituudi korraldusel toimuvast rahvusvahelisest konverentsist BEC'2002]

Rang, Toomas Mente et Manu 2002 / 8. okt., lk. 1 : ill https://www.ester.ee/record=b1242496*est

Balti elektroonikakonverents BEC 2010

Rang, Toomas Tallinna Tehnikaülikooli aastaraamat 2010 2011 / lk. 279-280

Balti elektroonikakonverentsid

Rang, Toomas Tallinna Tehnikaülikooli aastaraamat 2011 2012 / lk. 308-316

Baltic Electronics Conference 1996 : (BEC' 96)

Rang, Toomas Baltic electronics 1995 / 1, p. 38

Baltic Electronics Conference (BEC) series : long and winding road

Rang, Toomas BEC 2010 : 2010 12th Biennial Baltic Electronics Conference : proceedings of the 12th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 4-6, 2010, Tallinn, Estonia 2010 / p. 11-16

Baltic Electronics Conference BEC'96

Rang, Toomas Baltic electronics 1996 / 3, p. 25-26

BEC : Baltic Electronics Conference : proceedings of the 4th Biennial Conference, October 9-14, 1994, Tallinn (Estonia)

Rang, Toomas; Min, Mart; Ubar, Raimund-Johannes 1994

BEC 2002 : proceedings of the 8th Biennial Baltic Electronics Conference : October 6-9, 2002, Tallinn, Estonia

Rang, Toomas 2002 http://www.ester.ee/record=b2150914*est

BEC 2004 : proceedings of the 9th Biennial Baltic Electronics Conference : October 3-6, 2004, Tallinn, Estonia

2004 http://www.ester.ee/record=b2150914*est

BEC 2006 : 2006 International Baltic Electronics Conference : Tallinn University of Technology, October 2-4, 2006, Tallinn, Estonia : proceedings of the 10th Biennial Baltic Electronics Conference

Rang, Toomas 2006 http://www.ester.ee/record=b2150914*est

BEC 2006 järelkajad : [intervjuu Toomas Rangiga elektroonikute konverentsi teemal]

Rang, Toomas; Ummelas, Mart Mente et Manu 2006 / 18. okt., lk. 2 : fot https://www.ester.ee/record=b1242496*est

BEC 2008 : 2008 International Biennial Baltic Electronics Conference : proceedings of the 11th Biennial Baltic Electronics Conference : Tallinn University of Technology : October 6-8, 2008, Tallinn, Estonia

Rang, Toomas 2008 http://www.ester.ee/record=b2150914*est

BEC 2010 : 2010 12th Biennial Baltic Electronics Conference : proceedings of the 12th Biennial Baltic Electronics Conference : Tallinn University of Technology : October 4-6, 2010, Tallinn, Estonia

Rang, Toomas 2010 http://www.ester.ee/record=b2150914*est

BEC 2012 : 2012 13th Biennial Baltic Electronics Conference : proceedings of the 13th Biennial Baltic Electronics Conference : October 3-5, 2012, Tallinn, Estonia

2012 http://www.ester.ee/record=b2150914*est

BEC 2014 : 2014 14th Biennial Baltic Electronics Conference : proceedings of the 14th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 6-8, 2014, Tallinn, Estonia

Rang, Toomas 2014 http://www.ester.ee/record=b2150914*est

BEC 2016 : 2016 15th Biennial Baltic Electronics Conference : proceedings of the 15th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 3-5, 2016, Tallinn, Estonia

Rang, Toomas 2016 http://www.ester.ee/record=b2150914*est

BEC'96 : the 5th Biennial Baltic Electronics Conference, October 7-11, 1996, Tallinn, Estonia : proceedings

Rang, Toomas; Min, Mart; Ubar, Raimund-Johannes 1996 https://www.ester.ee/record=b2150914*est

BEC'98 : the 6th Biennial Conference on Electronics and Microsystems Technology, October 7-9, 1998, Tallinn, Estonia : proceedings

Rang, Toomas 1998 https://www.ester.ee/record=b2150914*est

Can 3D printing bring droplet microfluidics to every lab? - A systematic review

Gyimah, Nafisat; Scheler, Ott; Rang, Toomas; Pardy, Tamas Micromachines 2021 / art. 339 <https://doi.org/10.3390/mi12030339>
[Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Change in the parameters of electron-irradiated 4H-SiC Schottky diodes as a function of the time during low-temperature isothermal annealing

Korolkov, Oleg; Kozlovski, Vitali V.; Lebedev, Alexander A.; Toompuu, Jana; Sleptsuk, Natalja; Rang, Toomas Silicon Carbide and Related Materials 2018 : 12th European Conference on Silicon Carbide and Related Materials (ECSCRM 2018) : Selected, peer reviewed papers from the European Conference on Silicon Carbide and Related Materials (ECSCRM 2018), September 2-6, 2018, Birmingham, UK 2019 / p. 734-737 <https://doi.org/10.4028/www.scientific.net/MSF.963.734> [Conference proceeding at Scopus](#)
[Article at Scopus](#)

Characterization of deep level traps in semiconductor structures using numerical experiments

Koel, Ants; Rang, Toomas; Rang, Galina Materials characterization VII 2015 / p. 253-261 : ill

Characterization of silicon carbide (SiC) and graphene-based novel semiconductor devices = Ränikarbiidil (SiC) ja grafeenil põhinevate uudsete pooljuhtstruktuuride karakteriseerimine

Rashid, Muhammad Haroon 2021 https://www.ester.ee/record=b5397240*est <https://digikogu.taltech.ee/et/Item/a64fd50e-125c-49ad-b0a6-6ad2e01b8bfa> <https://doi.org/10.23658/taltech.6/2021>

Characterization of the temperature dependent behavior of snappy phenomenon by the switching-off of GaAs power diode structures

Koel, Ants; Rang, Toomas; Rang, Galina Heat transfer XIII : simulation and experiments in heat and mass transfer 2014 / p. 439-449 : ill <https://doi.org/10.2495/HT140381> [Conference proceedings at Scopus](#) [Article at Scopus](#)

Charge carrier transport in SiC Schottky interfaces : shape factor approach

Kurel, Raido; Rang, Toomas; Rang, Galina; Kasemaa, Argo BEC 2008 : 2008 International Biennial Baltic Electronics Conference : proceedings of the 11th Biennial Baltic Electronics Conference : Tallinn University of Technology : October 6-8, 2008, Tallinn, Estonia 2008 / p. 87-90 : ill

Circuit simulation program oriented physical modeling of integrated circuit elements

Rang, Toomas; Tamay, K.; Szekely, V. Periodica polytechnica. Electrical engineering = Электротехника 1980 / p. 37-45
https://www.ester.ee/record=b1198855*est

Clamp mode package diffusion welded power SiC Schottky diodes

Korolkov, Oleg; Kuznetsova, Natalja; Rang, Toomas BEC 2006 : 2006 International Baltic Electronics Conference : Tallinn University of Technology, October 2-4, 2006, Tallinn, Estonia : proceedings of the 10th Biennial Baltic Electronics Conference 2006 / p. 55-58 : ill

CMOS low power current source with reduced circuit complexity

Kasemaa, Argo; Rang, Toomas; Annus, Paul IEEE 9th International New Circuits and Systems Conference (NEWCAS) : Bordeaux-France, 26-29 June 2011 : [proceedings] 2011 / p. 17-20 <https://www.semanticscholar.org/paper/CMOS-low-power-current-source-with-reduced-circuit-Kasemaa-Rang/f5e490ce914a4c6c3195586a28147211c928c28d>

CMOS SP chip for resistor type semiconductor gas sensors

Kasemaa, Argo; Rang, Toomas The 7th Biennial Conference on Electronics and Microsystem Technology "Baltic Electronics Conference" : BEC 2000 : October 8 - 11, 2000, Tallinn, Estonia : conference proceedings 2000 / p. 255-256 : ill

CNN-Transformer Hybrid Model Towards Automated Droplet Image Quality Assessment of Portable Imaging Flow Cytometer

Afrin, Fariha; Ndubuisi Ezechukwu, Dismas; Le Moullec, Yannick; Pardy, Tamas; Rang, Toomas; Koel, Ants IEEE EUROCON 2025 - 21st International Conference on Smart Technologies 2025 / 6 p <https://doi.org/10.1109/EUROCON64445.2025.11073334>

Co-design of a wireless networked control system for reliability and resource-efficiency

Ashraf, Kanwal; Le Moullec, Yannick; Pardy, Tamas; Rang, Toomas 2024 19th Biennial Baltic Electronics Conference (BEC) 2024 / 7 p <https://doi.org/10.1109/BEC61458.2024.10737965> [Conference proceedings at Scopus](#) [Article at Scopus](#) [Article at WOS](#)

Co-design of wireless networked control systems : a reliable and resource-efficient approach

Ashraf, Kanwal; Le Moullec, Yannick; Pardy, Tamas; Rang, Toomas techrxiv.org 2024 / 9 p. : ill
<https://www.techrxiv.org/users/693853/articles/683291-co-design-of-wireless-networked-control-systems-a-reliable-and-resource-efficient-approach>

Cogniflow-drop : integrated modular system for automated generation of droplets in microfluidic applications

Jõemaa, Rauno; Gyimah, Nafisat; Ashraf, Kanwal; Pärnamets, Kaiser; Zaft, Alexander; Scheler, Ott; Rang, Toomas; Pardy, Tamas IEEE Access 2023 / p. 104905-104929 <https://doi.org/10.1109/ACCESS.2023.3316726> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Compact empirical model for droplet generation in a Lab-on-Chip cytometry system

Pärnamets, Kaiser; Udal, Andres; Koel, Ants; Pardy, Tamas; Gyimah, Nafisat; Rang, Toomas IEEE Access 2022 / p. 127708-127717 <https://doi.org/10.1109/ACCESS.2022.3226623> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Comparative characteristics of 6H- and 4H-SiC surfaces in diffusion welding

Korolkov, Oleg; Rang, Toomas Proceedings of the Estonian Academy of Sciences. Engineering 2001 / 4, p. 347-353 : ill

Comparative characteristics of diffusion welded Al contacts to 6H- and 4H-SiC substrates

Korolkov, Oleg; Rang, Toomas The 7th Biennial Conference on Electronics and Microsystem Technology "Baltic Electronics Conference" : BEC 2000 : October 8 - 11, 2000, Tallinn, Estonia : conference proceedings 2000 / p. 23-26 : ill

Comparative characteristics of diffusion-welded high-voltage stacks and connected in series Schottky diodes

Sleptšuk, Natalja; Korolkov, Oleg; Land, Raul; Toompuu, Jana; Annus, Paul; Rang, Toomas BEC 2016 : 2016 15th Biennial Baltic Electronics Conference : proceedings of the 15th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 3-5, 2016, Tallinn, Estonia 2016 / p. 39-42 : ill http://www.ester.ee/record=b2150914*est

Comparative investigation of the graphene-on-silicon carbide and CVD graphene as a basis for biosensor application

Sleptšuk, Natalja; Lebedev, Alexander A.; Elisayev, Ilya; Korolkov, Oleg; Toompuu, Jana; Land, Raul; Mikli, Valdek; Zubov, Alexander; Rang, Toomas Modern Materials and Manufacturing 2019 : 12th International DAAAM Baltic Conference and 27th International Baltic Conference BALTMATRIB 2019. Selected, peer reviewed papers from the conference Modern Materials and Manufacturing 2019 (MMM 2019), April 24-26, 2019, Tallinn, Estonia 2019 / p. 185-190 : ill https://www.ester.ee/record=b5235278*est <https://www.scientific.net/KEM.799.185> <https://doi.org/10.4028/www.scientific.net/KEM.799.185> [Conference proceeding at Scopus](#) [Article at Scopus](#)

Comparison of GaAs based high voltage diode stacks

Voitovitš, Viktor; Kuznetsova, Natalja; Rang, Toomas; Pikkov, Mihhail; Ruut, Jana EPE-PEMC 2004 : 11th International Power Electronics and Motion Control Conference : 2-4 September 2004, Riga, Latvia : proceedings. Vol. 2 of 7, Devices, control of converters, measurements and sensors 2004 / p. 2-391 - 2-394 : ill

Comparison of individual SiC JBS chips and JBS stacks connected in series by diffusion welding

Sleptšuk, Natalja; Korolkov, Oleg; Toompuu, Jana; Rang, Toomas BEC 2010 : 2010 12th Biennial Baltic Electronics Conference : proceedings of the 12th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 4-6, 2010, Tallinn, Estonia 2010 / p. 81-84 : ill

Comparison of the dynamic behaviour of complementary 6H- and 4H-SiC Schottky structures using numerical simulation

Rang, Toomas; Kurel, Raido Proceedings of the Estonian Academy of Sciences. Engineering 2004 / 3, p. 173-178

Comparison of turn-on characteristics of thyristor structures based on wide bandgap materials

Rang, Toomas; Vaselo, Aleksandr; Rang, Galina; Pikkov, Mihhail Proceedings of the Estonian Academy of Sciences. Engineering 2007 / 4, p. 445-454 : ill

Complementary multi guard ring JBS structures: numerical analysis

Koel, Ants; Rang, Toomas; Rang, Galina BEC 2010 : 2010 12th Biennial Baltic Electronics Conference : proceedings of the 12th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 4-6, 2010, Tallinn, Estonia 2010 / p. 85-88 : ill

Computer aided examination of I²L structures

Rang, Toomas International journal of electronics 1981 / p. 445-463 <https://doi.org/10.1080/00207218108901286>

Computer aided examination of the avalanche multiplication in Si, GaA and InP complementary pn-junctions

Rang, Toomas Modelling, simulation and control 1985 / p. 23-40

Computer aided modeling of high frequency power M-S structures

Rang, Toomas; Udal, Andres Proceedings of the seventh Colloquium on Microwave Communication : Budapest, 6-10 Sept. 1982 1982 / p. 238-241

Computer aided simulation of dynamic behaviour of the I²L flip-flop

Rang, Toomas Microelectronics '82 : proceedings of the 3. Microelectronics Conference of the Socialist Countries ; from 5.-7. May 1982, Siófok, Hungary 1982 / p. 153-154

Computer aided simulation of power Schottky Diodes

Rang, Toomas; Koel, Ants; Udal, Andres Modeling, Simulation and Control 1985 / p. 1-13

Computer-aided examination of the I²L current source and the behaviour of the I²L flip-flop used in static memory cells

Rang, Toomas Periodica polytechnica. Electrical engineering = Электротехника 1981 / p. 159-165 : joon https://www.ester.ee/record=b1198855*est <https://pp.bme.hu/ee/article/view/4776/3881>

Contact manufacturing technologies for wide band-gap semiconductor materials (invited)

Rang, Toomas BEC'98 : the 6th Biennial Conference on Electronics and Microsystems Technology, October 7-9, 1998, Tallinn, Estonia : proceedings 1998 / p. 17-28: ill

Current crowding phenomenon in JBC structures

Rang, Toomas; Kurel, Raido; Higelin, G.; Poirier, Laurent Computer Methods and Experimental Measurements for Surface Effects and Contact Mechanics VII 2005 / p. 387-396 <https://www.witpress.com/elibrary/wit-transactions-on-engineering-sciences/49/15383>

Current suppressing effect in alloy metal and 6H-SiC substrate Schottky contacts

Rang, Toomas; Blum, Alfons BEC'96 : the 5th Biennial Baltic Electronics Conference, October 7-11, 1996, Tallinn, Estonia : proceedings 1996 / p. 81-84: ill

Deep reinforcement learning-based digital twin for droplet microfluidics control

Gyimah, Nafisat; Scheler, Ott; Rang, Toomas; Pardy, Tamas Physics of Fluids 2023 / art. 082020 <https://doi.org/10.1063/5.0159981>
[Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Design of a highly efficient analog-to-digital converter for Wi-Fi 7 devices = Pidevaja Sigma-Delta muunduri disain Wi-Fi 7 seadmete

Kampus, Vahur 2025 https://www.ester.ee/record=b5752898*est <https://digikogu.taltech.ee/et/Item/156d4c1c-e0f9-45aa-93a9-2cc8f1431aa0>
<https://doi.org/10.23658/taltech.46/2025>

Design of Cyber Bio-analytical Physical Systems : formal methods, architectures, and multi-system interaction strategies

Ashraf, Kanwal; Le Moullec, Yannick; Pardy, Tamas; Rang, Toomas Microprocessors and microsystems 2023 / art. 104780, 14 p. : ill <https://doi.org/10.1016/j.micpro.2023.104780> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Design of two stage high efficiency power amplifier in 0.13um technology for 2.4 GHz ISM band applications

Patankar, Udayan Sunil; Koel, Ants; Rang, Toomas Journal of Advanced Research in Dynamical and Control Systems 2018 / p. 822–829 <http://www.jardcs.org/backissues/abstract.php?archiveid=3585>

Development of a low-cost, wireless smart thermostat for isothermal DNA amplification in lab-on-a-chip devices

Pardy, Tamas; Sink, Henri; Koel, Ants; Rang, Toomas Micromachines 2019 / art. 437, 13 p. : ill <https://doi.org/10.3390/mi10070437>
[Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Development of automated detection and wireless reporting for a handheld point-of-care test

Pardy, Tamas; Filograno, Leonardo; Baumann, Cindy; **Rang, Toomas** 2020 17th Biennial Baltic electronics conference, Tallinn, Estonia, October 6-8, 2020 : proceedings 2021 / 4 p. : ill <https://doi.org/10.1109/BEC49624.2020.9276773>

Development of e-learning course: myths and reality

Rang, Toomas; Rang, Galina Symposium "Topical Problems of Education in the Field of Electrical and Power Engineering" : Kuressaare, Estonia, January 19-24, 2004 2004 / p. 9-11

Development of national standard for voltage unit based on solid-state references = Pinge mõõtühiku riigietaloni arendamise Zener-tüüpi etalonpingeallikate baasil

Pokatilov, Andrei; Kübarsepp, Toomas 2008 https://www.ester.ee/record=b2425069*est

Development of temperature control solutions for non-instrumented nucleic acid amplification tests (NINAAT)

Pardy, Tamas; Rang, Toomas; Tulp, Indrek Micromachines 2017 / p. 1-11 : ill <https://doi.org/10.3390/mi8060180> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Diffusion welded Al contacts to p-type SiC

Korolkov, Oleg; Rang, Toomas; Syrkin, A.; Dmitriev, V. Silicon Carbide and Related Materials 2002 : ECSCRM2002 2003 / p. 697-700 <https://www.scientific.net/MSF.433-436.697>

Diffusion welded contacts and related art applied to semiconductor materials

Korolkov, Oleg; Sleptšuk, Natalja; Toompuu, Jana; Rang, Toomas Elektronika ir elektrotehnika = Electronics and electrical engineering 2011 / p. 67-70 : ill <https://eejournal.ktu.lt/index.php/elt/article/view/359>

Diffusion welded contacts for silicon semiconductor devices

Korolkov, Oleg; Rang, Toomas Proceedings of the International Conference and Exhibition Micro Materials : MicroMat '97, April 16-18, 1997, Berlin, Germany 1997 / p. 1035-1037

The diffusion welded contacts in power electronics

Korolkov, Oleg; Rang, Toomas BEC : Baltic Electronics Conference : proceedings of the 4th Biennial Conference, October 9-14, 1994, Tallinn (Estonia). 2 1994 / p. 573-578: ill https://www.ester.ee/record=b2150914*est

Diffusion welding contacts to 6H-SiC substrates

Korolkov, Oleg; Rang, Toomas 43. Internationales Wissenschaftliches Kolloquium, 21.-24.09.1998 1998 / p. 47-48

Diffusion welding techniques for power SiC Schottky packaging

Korolkov, Oleg; Rang, Toomas; Syrkin, A.; Dmitriev, V. Final program of the 12th International Conference on Silicon Carbide and Related Materials : ICSCRM2005 : Pittsburgh, PA, USA 2005 / p. 71

Diffusion welding techniques for power SiC Schottky packaging

Korolkov, Oleg; Rang, Toomas; Syrkin, A.; Dmitriev, V. Silicon carbide and related materials 2005 2006 / p. 919-922

Diffusion welding technology as a method of metallization of ceramic substrates

Korolkov, Oleg; Rang, Toomas BEC'96 : the 5th Biennial Baltic Electronics Conference, October 7-11, 1996, Tallinn, Estonia : proceedings 1996 / p. 479-482: ill

Diffusion welding technology for 6H-SiC substrates

Korolkov, Oleg; Rang, Toomas BEC'98 : the 6th Biennial Conference on Electronics and Microsystems Technology, October 7-9, 1998, Tallinn, Estonia : proceedings 1998 / p. 251-252: ill

Diffusion welding technology for wide bandgap materials

Rang, Toomas; Korolkov, Oleg Proceedings of the European COPEX Seminar, June 17-19, 1997, Vienna, Austria 1997 / p. 124-127

Digital twin for controlled generation of water-in-oil microdroplets with required size

Gyimah, Nafisat; Scheler, Ott; Rang, Toomas; Pardy, Tamas 2022 23rd International Conference on Thermal, Mechanical and Multi-Physics Simulation and Experiments in Microelectronics and Microsystems (EuroSimE), 25-27 April 2022, St Julian, Malta : proceedings 2022 / p. 85-91 <https://doi.org/10.1109/EuroSimE54907.2022.9758876>

DLTS measurements on 4H-SiC JBS-diodes with boron implanted local p-n junctions

Ivanov, Pavel; Korolkov, Oleg; Samsonova, Tatyana; Sleptšuk, Natalja; Potapov, Alexander; Toompuu, Jana; Rang, Toomas Materials science forum 2011 / p. 409-412 https://www.researchgate.net/publication/272046403_DLTS_measurements_on_4H-SiC_JBS-diodes_with_boron_implanted_local_p-n_junctions

Education environment for electronics and microsystems

Ajaots, Mado; Min, Mart; Rang, Toomas; Ubar, Raimund-Johannes Microelectronics education : proceedings of the European Workshop, Grenoble, France, 5-6 Feb 1996 1996 / p. 145-148: ill

Education environment for electronics and microsystems

Ajaots, Mado; Min, Mart; Rang, Toomas; Ubar, Raimund-Johannes First European Workshop on Microelectronics Education, Villard de Lans, France, February 5-6, 1996 : proceedings 1996 / p. 39

Effects of the inclusion of armchair graphene nanoribbons on the electrical conduction properties of NN-heterojunction 4H-6H/SiC diodes

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas Advanced Materials and Processing Technologies : 2nd International Conference on Sensors, Materials and Manufacturing (ICSMM 2018, November 19-21, 2018, Taiwan); International Conference on Materials Sciences and Nanomaterials (ICMSN 2018, July 11-13, 2018, United Kingdom) and the 2nd International Conference on Materials and Intelligent Manufacturing (ICMIM 2018, August 24-26, 2018, Japan) 2019 / p. 29-35 : ill
<https://doi.org/10.4028/www.scientific.net/MSF.962.29> Conference proceeding at Scopus Article at Scopus

Ela ise ja lase ka teistel elada! : [T.Rangi nägemus Tehnikaülikooli arengust eelseisvaks viieks aastaks]

Rang, Toomas Mente et Manu 2005 / 12. jaan., lk. 5-6. (TTÜ 2005-2010) https://www.ester.ee/record=b1242496*est

Electron microscopy study of contact layers in n-type 4H-SiC after diffusion welding

Korolkov, Oleg; Sleptšuk, Natalja; Sitnikova, A.; Rang, Toomas BEC 2008 : 2008 International Biennial Baltic Electronics Conference : proceedings of the 11th Biennial Baltic Electronics Conference : Tallinn University of Technology : October 6-8, 2008, Tallinn, Estonia 2008 / p. 91-94 : ill

Electronics design and test

Ubar, Raimund-Johannes; Kruus, Margus; Rang, Toomas Public service review : European Union. 13 2007 / p. 52-53

Electronics in Estonia

Rang, Toomas BEC'96 : the 5th Biennial Baltic Electronics Conference, October 7-11, 1996, Tallinn, Estonia : proceedings 1996 / p. 49-56: ill

Elektroonika - mis see on?

Rang, Toomas Elektroonika 2004 : XI rahvusvahelise telekommunikatsioonipäeva materjalid 2004 / lk. 7-9

Elektroonika Eestis - tööstus, haridus, teadus

Rang, Toomas Tallinna Tehnikaülikooli aastaraamat 1996 1997 / lk. 221-230

Elektroonika Eestis - tööstus, teadus, haridus - järeloomõtteid

Rang, Toomas Insenerikultuur Eestis. 3 1997 / lk. 139-147 https://www.ester.ee/record=b1063622*est

Elektroonika kui Eesti innovatsioonisüsteemi infrastruktuur

Min, Mart; Rang, Toomas; Ubar, Raimund-Johannes Eesti teadlaste kongress, 11.-15. augustini 1996. a. Tallinnas : ettekannete kokkuvõtteid 1996 / lk. 265 https://www.ester.ee/record=b1052731*est

Elektroonikainseneride harimisest meil ja mujal

Rang, Toomas Elektroonika 2000 : VII rahvusvahelise telekommunikatsioonipäeva konverentsi ettekannete materjalid 2000 / lk. 7-14 https://www.ester.ee/record=b1399956*est

Elektroonikaspetsialistide koolitus tööstuse tarbeks - Elektroonikainstituudi visioon

Rang, Toomas Raadiotehnika 2001 : VIII rahvusvahelise telekommunikatsioonipäeva materjalid 2001 / lk. 110-114 : ill

Elektroonikud pidasid konverentsi : [BEC'98]

Rang, Toomas Tehnikaülikool 1998 / 12. okt., lk. 1

11th Baltic Electronics conference BEC2008

Rang, Toomas Estonian journal of engineering 2010 / 1, p. 5-6 : ill

Embedded blur-free single-image acquisition pipeline for droplet microfluidic imaging flow cytometry (IFC)

Afrin, Fariha; Pärnamets, Kaiser; Le Moullec, Yannick; Udal, Andres; Koel, Ants; Pardy, Tamas; Rang, Toomas IEEE Access 2024 / p. 92431-92441 <https://doi.org/10.1109/ACCESS.2024.3421637>

Estonian electronic industry

Rang, Toomas Automation, simulation & measurement : ASM'91 : 3rd biennial conference, Tallinn, October 7-11, 1991. Section S / Tallinn Technical University 1992 / p. 4-10: ill

Estonian electronic industry - May 1995

Rang, Toomas; Tani, Harry; Tamm, Uljas Baltic electronics 1995 / 1, p. 12-16: ill

Et progressirongist mitte maha jääda : [V Balti Elektroonika Konverents]

Rang, Toomas Tehnikaülikool 1996 / 11. okt., lk. 1-2 https://www.ester.ee/record=b5309277*est

E-õppe müüdid ja tegelikkus : omad ja laenatud kogemused

Rang, Toomas Avaja 2004 / 21. jaan., lk. 8 : portr

Exercises. Final test questions : supplementary material in the course "Microelectronics"

Rang, Toomas 2003 https://www.ester.ee/record=b1766979*est

Experimental analysis of the dynamic performance of Si, GaAs and SiC diodes

Blinov, Andrei; Vinnikov, Dmitri; Rang, Toomas BEC 2012 : 2012 13th Biennial Baltic Electronics Conference : proceedings of the 13th Biennial Baltic Electronics Conference : October 3-5, 2012, Tallinn, Estonia 2012 / p. 49-52 : ill

Experimental study of surface distortions in silicon carbide caused by diffusion welding

Mizsei, Janos; Korolkov, Oleg; Sleptšuk, Natalja; Toompuu, Jana; Rang, Toomas BEC 2012 : 2012 13th Biennial Baltic Electronics Conference : proceedings of the 13th Biennial Baltic Electronics Conference : October 3-5, 2012, Tallinn, Estonia 2012 / p. 53-56 : ill

Feasibility study of Si and SiC MOSFETs in high-gain DC/DC converter for renewable energy applications

Blinov, Andrei; Chub, Andrii; Vinnikov, Dmitri; Rang, Toomas Proceedings : IECON 2013 - 39th Annual Conference of the IEEE Industrial Electronics Society : Austria Center Vienna, Vienna, Austria, 10-14 November, 2013 2013 / p. 5975-5978 : ill <https://doi.org/10.1109/IECON.2013.6700115> [Conference Proceedings at Scopus](#) [Article at Scopus](#)

Félvezető technológia számítógépes szimulációja

Rang, Toomas; Tamay, K.; Mizsei, Janos Híradástechnika = Journal on communications, computers, convergence, contents, companies 1980 / p. 327-328

Finite element modelling for the optimization of microheating in disposable molecular diagnostics

Pardy, Tamas; Rang, Toomas; Tulp, Indrek International journal of computational methods and experimental measurements 2017 / p. 13-22 : ill <https://doi.org/10.2495/CMEM-V5-N1-13-22> [Journal metrics at Scopus](#) [Article at Scopus](#)

Finite element modelling for the optimization of microheating in disposable molecular diagnostics [Electronic resource]
Pardy, Tamas; Rang, Toomas; Tulp, Indrek 14th International Conference on Simulation and Experiments in Heat Transfer and its Applications : Heat Transfer 2016 : 7-9 September, 2016 Ancona, Italy : unedited papers 2016 / p. [144-155] : ill. [USB]

Finite element modelling of the resistive heating of disposable molecular diagnostics devices

Pardy, Tamas; Rang, Toomas; Tulp, Indrek Computational methods and experimental measurements XVII 2015 / p. 381-391 : ill
<http://dx.doi.org/10.2495/CMEM150341>

First principles simulations of phenol and methanol detector based on pristine graphene nanosheet and armchair graphene nanoribbons

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas Sensors 2019 / art. 2731, 14 p. : ill <https://doi.org/10.3390/s19122731>
[Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Foreford : twenty years of Baltic Electronics Conference in Tallinn

Rang, Toomas Proceedings of the Estonian Academy of Sciences. Engineering 2006 / 3-2, p. 244-245

Formation of Diffusion welded Al contacts to semiconductor silicon carbide

Korolkov, Oleg 2004

Formation of large area Al contacts on 6H- and 4H-SiC substrates

Korolkov, Oleg; Rang, Toomas Abstracts of the 3rd European Conference on Silicon Carbide and Related Materials : ECSCRM'2000 : Sept. 3-7, 2000, Kloster Banz, Germany 2000 / p. 188 <https://www.scientific.net/MSF.353-356.603>

Formation of large area Al contacts on 6H- and 4H-SiC substrates

Korolkov, Oleg; Rang, Toomas Silicon Carbide and Related Materials : ECSCRM2000 : proceedings of the 3rd European Conference on Silicon Carbide and Related Materials : Kloster Banz, Germany, September 2000 2001 / p. 603-606 : ill

A fully differential, 200MHz, programmable gain, level-shifting, hybrid amplifier/power combiner/test buffer, using pre-distortion for enhanced linearity

Kampus, Vahur; Rang, Toomas; Knaller, Daniel PRIME 2018 : 14th Conference on PhD Research in Microelectronics and Electronics 2018 / p. 5-8 : ill <https://doi.org/10.1109/PRIME.2018.8430372>

GaAs based diffusion welded high voltage diode stacks [Electronic resource]

Toompuu, Jana; Korolkov, Oleg; Sleptšuk, Natalja; Voitovitš, Viktor; Rang, Toomas IEEE International Conference on Semiconductor Electronics CD-ROM Proceedings 2010 / [4] p <https://ieeexplore.ieee.org/document/5549505>

Generalized analytical model for SiC polytypic heterojunctions

Rang, Toomas; Tabun, Indrek; Rang, Galina; Koel, Ants Estonian journal of engineering 2011 / 2, p. 151-157 : ill

Globaliseerumisest ja konkursivõimest ülikoolimaailmas

Rang, Toomas; Hendre, Enn Mente et Manu 2002 / 19., 26. veebr., lk. 2 https://www.ester.ee/record=b1242496*est

High performance GaAs power diodes

Voitovitš, Viktor; Rang, Toomas; Rang, Galina; Pikkov, Mihhail BEC 2008 : 2008 International Biennial Baltic Electronics Conference : proceedings of the 11th Biennial Baltic Electronics Conference : Tallinn University of Technology : October 6-8, 2008, Tallinn, Estonia 2008 / p. 111-114 : ill

High quality LPE GaAs power diodes with DLTS method

Rang, Toomas Public service review : European Union 2009 / p. 423

High quality metal ceramic interfaces using diffusion welding technology

Korolkov, Oleg; Rang, Toomas Proceedings of the ASDAM'96, Oct. 20-24, 1996, Bratislava, Slovakia 1996 / p. 309-312

High voltage diffusion/welded stacks on the basis of SiC Schottky diodes

Korolkov, Oleg; Sleptšuk, Natalja; Annus, Paul; Land, Raul; Rang, Toomas ICSRM 2015 : program guide 2015 / p. 73

High voltage GaAs diode stacks : the choice of epistructures for assembling

Rang, Toomas; Voitovitš, Viktor; Kuznetsova, Natalja Design, Test, Integration and Packaging of MEMS/MOEMS - DTIP2004 : 12-14 May 2004, Montreux, Switzerland 2004 / p. 199-202 : ill

High-voltage diffusion/welded stacks on the basis of SiC Schottky diodes

Korolkov, Oleg; Sleptšuk, Natalja; Annus, Paul; Land, Raul; Rang, Toomas Silicon carbide and related materials 2015 (ICSRM 2015) : selected, peer reviewed papers from the 16th International Conference on Silicon Carbide and Related Materials, October 4-9, 2015, Giardini Naxos, Italy 2016 / p. 790-794 : ill <https://doi.org/10.4028/www.scientific.net/MSF.858.790> [Conference Proceedings at Scopus](#) [Article at Scopus](#)

Hot spots caused by contact inhomogeneities in 4H- and 6H-SiC Schottky structures

Kurel, Raido; Rang, Toomas Advanced Computational Methods in Heat Transfer VI 2000 / p. 437-444

<https://www.witpress.com/elibrary/wit-transactions-on-engineering-sciences/27/4468>

PL új irányrat a bipoláris technikában I

Rang, Toomas Mérés és automatika: megjelenik a Méréstechnikai és Automatizálási Tudományos Egyesület Szerkesztésében 1979 / p. 191-195

PL, új irányrat a bipoláris technikában II

Rang, Toomas Mérés és automatika: megjelenik a Méréstechnikai és Automatizálási Tudományos Egyesület Szerkesztésében 1979 / p. 279-283

Innovatsioon - võimalus või vajadus

Rang, Toomas Arengusuundumused Eestis ja Võrumaal 1997 / lk. 11-18

Instrument-free Lab-on-a-Chip DNA amplification test for pathogen detection [Online resource]

Pardy, Tamas; Rang, Toomas; Kremer, Clemens; Tulp, Indrek BEC 2018 : 2018 16th Biennial Baltic Electronics Conference (BEC) : proceedings of the 16th Biennial Baltic Electronics Conference, October 8-10, 2018 2018 / 4 p. : ill

<https://doi.org/10.1109/BEC.2018.8600991>

Integraalskeemide projekteerimine : metoodiline juhend

1988 https://www.ester.ee/record=b1239938*est

Integrált áramköri elemek fizikai modellezése áramkölanalizős program segítségével

Rang, Toomas; Tamay, K.; Szekely, V. Híradástechnika = Journal on communications, computers, convergence, contents, companies 1980 / p. 322-326

Integrated self-regulating resistive heating for isothermal nucleic acid amplification tests (NAAT) in Lab-on-a-Chip (LoC) devices

Pardy, Tamas; Tulp, Indrek; Kremer, Clemens; Rang, Toomas; Stewart, Ray PLoS ONE 2017 / p. 1-11 : ill

<https://doi.org/10.1371/journal.pone.0189968> Journal metrics at Scopus Article at Scopus Journal metrics at WOS Article at WOS

Interfaces to 6H-SiC substrates - technology and simulation

Rang, Toomas; Blum, Alfons Proceedings of the Estonian Academy of Sciences. Engineering 1997 / 4, p. 250-259: ill

Interpretation of some physical parameters of SiC Schottky interfaces manufactured by diffusion welding technology

Rang, Toomas; Korolkov, Oleg; Ljutov, Jevgeni Proceedings of the Estonian Academy of Sciences. Engineering 2004 / 3, p. 179-184

Investigation of additional states in the silicon carbide surface after diffusion welding

Mizsei, Janos; Korolkov, Oleg; Sleptšuk, Natalja; Toompuu, Jana; Rang, Toomas ICSCRM2011 : Cleveland Ohio, USA, September 11-16, 2011 : abstracts 2011 / p. 356 : ill

https://www.researchgate.net/publication/269377410_Investigation_of_Additional_States_in_the_Silicon_Carbide_Surface_after_Diffusion_Welding

Investigation of barrier inhomogeneities and electronic transport on Al-Foil/p-Type-4H-SiCSchottky barrier Diodes using diffusion welding

Ziko, Mehadi Hasan; Koel, Ants; Rang, Toomas; Rashid, Muhammad Haroon Crystals 2020 / p. 636-647

<https://doi.org/10.3390/cryst10080636> Journal metrics at Scopus Article at Scopus Journal metrics at WOS Article at WOS

Investigation of deep level centers in i- and n-layers of GaAs pin-diodes

Toompuu, Jana; Korolkov, Oleg; Sleptšuk, Natalja; Rang, Toomas BEC 2014 : 2014 14th Biennial Baltic Electronics Conference : proceedings of the 14th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 6-8, 2014, Tallinn, Estonia 2014 / p. 25-28 : ill

Investigation of electrical characteristics of SiC based complementary JBS structures

Kurel, Raido 2005 https://www.ester.ee/record=b2053292*est

Investigation of p-i-n GaAs structures by DLTS method

Toompuu, Jana; Korolkov, Oleg; Sleptšuk, Natalja; Rang, Toomas Elektronika ir elektrotehnika = Electronics and electrical engineering 2010 / 4, p. 51-54 : ill https://www.researchgate.net/publication/267372152_Investigation_of_p-i-n_GaAs_structures_by_DLTS_method

Investigation of subcontact layers in SiC after diffusion welding

Korolkov, Oleg; Kuznetsova, Natalja; Sitnikova, A.; Viljus, Mart; Rang, Toomas Silicon carbide and related materials 2007 2009 / p. 647-650

Investigation of subcontact layers in SiC after diffusion welding

Korolkov, Oleg; Kuznetsova, Natalja; Sitnikova, A.; Viljus, Mart; Rang, Toomas Silicon carbide and related materials 2007 / p. 100 <https://www.scientific.net/MSF.600-603.647>

Investigation of the combined stress and strain situation in diffusion welded rectifying elements

Korolkov, Oleg; Rang, Toomas; Kurel, Raido Surface treatment VI 2003 / p. 307-316 <https://www.witpress.com/elibrary/wit-transactions-on-engineering-sciences/39/1441>

Investigation of the graphene-on-silicon-carbide and CVD graphene as a basis for bioimpedance sensor applications : poster

Sleptšuk, Natalja; Land, Raul; Toompuu, Jana; Lebedev, Alexander A.; Davydov, Valery; Eliseyev, Ilya; Kalinina, Evgenia; Korolkov, Oleg; Rang, Toomas ePosters 2018 / 1 p.: ill <https://cdn.technologynetworks.com/ep/pdfs/natalja-sleptsuk-a-raul-land-a-jana-toompuu-a-alexander-lebedev-b-valery-davydov-b-ilya-eliseyev-b.pdf>

Investigation of the intermediate layer in the metal-silicon carbide contact obtained by diffusion welding = Difusioonkeevitusega valmistatud metalli ja ränikarbiidi vahelise üleminekuala vahekihi uurimine

Sleptšuk, Natalja 2011 https://www.ester.ee/record=b2692547*est

Ja nii nad tapsidki Ferdinandi... : [muutustest ülikoolides, ka TTÜs]

Rang, Toomas Mente et Manu 2008 / 16. apr., lk. 2, 4 : portr. ; 30. apr., lk. 2 ; 16. mai, lk. 2 ; 30. mai, lk. 2 https://www.ester.ee/record=b1242496*est

Joint optimization via deep reinforcement learning in wireless networked controlled systems

Ashraf, Kanwal; Le Moullec, Yannick; Pardy, Tamas; Rang, Toomas IEEE Access 2022 / p. 67152-67167 <https://doi.org/10.1109/ACCESS.2022.3185244> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Kalman Tarnay (1929 - 1998)

Rang, Toomas The 7th Biennial Conference on Electronics and Microsystem Technology "Baltic Electronics Conference" : BEC 2000 : October 8 - 11, 2000, Tallinn, Estonia : conference proceedings 2000 / p. V : portr

Kas ilma elektroonikata on elu Eestis võimalik?

Rang, Toomas IV Välis-Eesti kongress, 29.-30. juunil 1999. a. Tallinnas : ettekannete kokkuvõtted 1999 / lk. 106-108

Kolledžis elektroonika õppekaval roheline tee : [Maret Panga ja Toomas Rangi kommentaaridega]

Aavik, Svea; **Pank, Maret; Rang, Toomas** Meie Maa 2003 / 30. apr., lk. 1

Kuhu lähed, Tehnikaülikool? : [TTÜ koht Eestis, tegevuse eesmärgid, tegevusvaldkonnad, ressursid, õppekavad, õppejõud ja üliõpilased, koostöö jm.]

Rang, Toomas Tehnikaülikool 1999 / 29. apr., lk. 5-8

Laia keelutsooniga pooljuhtmaterjalidel põhinevad pooljuhtseadised

Rang, Toomas; Rang, Galina Teadusmõte Eestis (X). Tehnikateadused. 3 : [artiklikogumik] 2019 / lk. 169-176 : ill., fot https://www.ester.ee/record=b5208765*est

Large area 4H-SiC power Schottky diode

Rang, Toomas; Korolkov, Oleg; Pikkov, Mihhail Proceedings of the 3rd International Conference and Exhibition Micro Materials : MicroMat2000 : April 17-19, 2000, Berlin, Germany 2000 / p. 890-893

Large area 4H-SiC power Schottky diode

Rang, Toomas; Korolkov, Oleg; Pikkov, Mihhail Abstracts of the 3rd International Conference and Exhibition Micro Materials : MicroMat2000 : April 17-19, 2000, Berlin, Germany 2000 / p. 303-304

Large area 6H-SiC Schottky diode

Rang, Toomas; Korolkov, Oleg; Pikkov, Mihhail Proceedings of the Estonian Academy of Sciences. Engineering 2000 / 2, p. 155-159 : ill https://artiklid.elnet.ee/record=b1004045*est

Large area high quality interfaces to SiC substrates - technology and modelling

Rang, Toomas; Korolkov, Oleg; Kurel, Raido; Pikkov, Mihhail Materials mechanics, fracture mechanics, micro mechanics 1999 / p. 574-579: ill

Life-time characterization of LEDs

Paisnik, Kristo; Rang, Galina; Rang, Toomas Estonian journal of engineering 2011 / 3, p. 241-251 : ill

Lightweight CNN-based Microfluidic Droplet Classification for Portable Imaging Flow Cytometry

Afrin, Fariha; Le Moullec, Yannick; Pardy, Tamas; Rang, Toomas Proceedings of the Estonian Academy of Sciences 2025 / p.

Low noise LDO architecture with consideration for low voltage operation

Mihhailov, Juri; Strik, Viktor; Strik, Sergei; **Rang, Toomas** BEC 2014 : 2014 14th Biennial Baltic Electronics Conference : proceedings of the 14th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 6-8, 2014, Tallinn, Estonia 2014 / p. 41-44 : ill

Low power CMOS current source for shortened square wave signals

Kasemaa, Argo; Rang, Toomas BEC 2010 : 2010 12th Biennial Baltic Electronics Conference : proceedings of the 12th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 4-6, 2010, Tallinn, Estonia 2010 / p. 89-92 : ill

Low-cost, portable dual-channel pressure pump for droplet microfluidics

Jõemaa, Rauno; Grosberg, Martin; Rang, Toomas; Pardy, Tamas 2022 45th Jubilee International Convention on Information, Communication and Electronic Technology (MIPRO), 23-27 May 2022, Opatija, Croatia : proceedings 2022 / p. 205-211 : ill
<https://doi.org/10.23919/MIPRO55190.2022.9803371>

Low-temperature annealing of lightly doped n-4H-SiC layers after irradiation with fast electrons

Korolkov, Oleg; Kozlovski, Vitali V.; Lebedev, Alexander A.; **Sleptšuk, Natalja; Toompuu, Jana; Rang, Toomas** Semiconductors 2019 / p. 975-978 <https://doi.org/10.1134/S1063782619070133> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

LPE technology for power GaAs diode structures

Voitovitš, Viktor; **Rang, Toomas; Rang, Galina** Estonian journal of engineering 2010 / 1, p. 11-22 : ill

Lugupeetud TÜ rektor prof. J. Aaviksoo : pöördumine

Uibu, Jaak; **Roosimaa, Toivo**; Einasto, R.; Vooglaid, Ülo; Tõnstein, A.; Naelapea, A. E.; **Rang, Toomas; Koslov, Vladimir** Sirp 2000 / 20. apr., lk. 20

Maaelektriku teatmik

1975 https://www.ester.ee/record=b1304264*est

Majanduskomisjon 2010–2016

Rang, Toomas Uuele kvaliteedile ja vääriskale positsioonile : Tallinna Tehnikaülikool 2000-2015 2018 / lk. 248-263
http://www.ester.ee/record=b4775778*est <https://digi.lib.ttu.ee/i/?10910>

Materials and contact characterisation VIII

2017 <https://www.witpress.com/books/978-1-78466-197-7>

Metallization technologies for wide band-gap semiconductor substrates : (invited paper)

Rang, Toomas; Korolkov, Oleg; Pikkov, Mihhail Proceedings of the 6th Nexuspans Workshop Microsystems Technology Activities in Baltic Region : 23-24 April, 1999, Vilnius, Lithuania 1999 / p. 27-30

Method of samples preparation intended for research of deep centers in i-, n-, and p-layers of GaAs p⁺-pin-n⁺ structures and result of analysis

Toompuu, Jana; Sleptšuk, Natalja; Korolkov, Oleg; Rang, Toomas BEC 2016 : 2016 15th Biennial Baltic Electronics Conference : proceedings of the 15th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 3-5, 2016, Tallinn, Estonia 2016 / p. 35-38 : ill http://www.ester.ee/record=b2150914*est

Microheating solution for molecular diagnostics devices = Mikrosoojendamine molekulaardiagnostika seadistes

Pardy, Tamas 2018 <https://digi.lib.ttu.ee/i/?9249> https://www.ester.ee/record=b4759173*est

Mille poolest erineb TTÜ... : [intervjuu Toomas Rangiga]

Rang, Toomas Avaja 2003 / 18. det., lk. 2 : fot

Model-based system architecture for event-triggered wireless control of bio-analytical devices

Ashraf, Kanwal; Le Moullec, Yannick; Pardy, Tamas; Rang, Toomas 2021 24th Euromicro Conference on Digital System Design (DSD), 01-03 September 2021 2021 / p. 465-471 : ill <https://doi.org/10.1109/DSD53832.2021.00076>

Modeling and simulations of 4H-SiC/6H-SiC/4H-SiC single quantum-well light emitting diode using diffusion bonding technique

Rashid, Muhammad Haroon; **Koel, Ants; Rang, Toomas** Micromachines 2021 / art. 1499 <https://doi.org/10.3390/mi12121499> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Modeling in semiconductor electronics

Javor, A.; **Rang, Toomas**; Szekely, V.; Tarnay, K.; **Velmre, Enn** 1993 https://www.ester.ee/record=b1031052*est

Modeling in semiconductor electronics

Velme, Enn; Rang, Toomas BEC : Baltic Electronics Conference : proceedings of the 4th Biennial Conference, October 9-14, 1994, Tallinn (Estonia). 2 1994 / p. 501-516: ill https://www.eester.ee/record=b2150914*est

Modelling and experimental characterisation of self-regulating resistive heating elements for disposable medical diagnostics devices

Pardy, Tamas; Rang, Toomas; Tulp, Indrek Materials characterization VII 2015 / p. 263-271 : ill

Modelling and experimental characterisation of thermoelectric heating for molecular diagnostics devices

Pardy, Tamas; Rang, Toomas; Tulp, Indrek BEC 2016 : 2016 15th Biennial Baltic Electronics Conference : proceedings of the 15th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 3-5, 2016, Tallinn, Estonia 2016 / p. 27-30 : ill http://www.eester.ee/record=b2150914*est

Modelling of inhomogeneities of SiC Schottky interfaces

Rang, Toomas Software for Electrical Engineering Analysis and Design V : [Fifth International Conference ... : Electrosoft V] 2001 / p. 3-15 : ill <https://www.witpress.com/Secure/elibrary/papers/ES01/ES01000FU.pdf>

Modelling of metal alloy contacts to semiconductor substrate

Rang, Toomas Simulation and design of microsystems and microstructures 1995 / p. 251-258: ill <https://www.witpress.com/Secure/elibrary/papers/MIC95/MIC95030FU.pdf>

Modelling of the tunneling current in metal alloy contacts to 6H- and 4H-SiC substrates

Rang, Toomas MICROSIM II : simulation and design of microsystems and microstructures 1997 / p. 23-31 : ill

Nano- and Micro-Scale simulations of Ge/3C-SiC and Ge/4H-SiC NN-heterojunction diodes

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas Silicon Carbide and Related Materials 2019 : 18th International Conference on Silicon Carbide and Related Materials 2019 (ICSCRM 2019), Kyoto, Japan, September 29 - October 4, 2019 Materials science forum 2020 / p. 490-496 <https://doi.org/10.4028/www.scientific.net/MSF.1004.490> [Conference proceedings at Scopus](#) [Article at Scopus](#)

Nano and micro-scale simulations of Si/4H-SiC and Si/3C-SiC NN-heterojunction diodes

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas Silicon Carbide and Related Materials 2018 : 12th European Conference on Silicon Carbide and Related Materials (ECSCRM 2018) : Selected, peer reviewed papers from the European Conference on Silicon Carbide and Related Materials (ECSCRM 2018), September 2-6, 2018, Birmingham, UK 2019 / p. 357-361 <https://doi.org/10.4028/www.scientific.net/MSF.963.357> [Conference proceeding at Scopus](#) [Article at Scopus](#)

Nanoscale and microscale simulations of N-N junction heterostructures of 3C-4H silicon carbide

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas; Gähwiler, Reto; Grosberg, Martin; Jõemaa, Rauno Materials and contact characterisation VIII 2017 / p. 235-248 : ill <https://doi.org/10.2495/MC170241> [Conference proceedings at Scopus](#) [Article at Scopus](#)

New interdisciplinary master program in communicative electronics at Tallinn University of Technology

Rang, Toomas; Sleptšuk, Natalja 5th International Conference on Interdisciplinarity in Education ICIE'10 : New Higher Education Programs, June 17-19, 2010, Tallinn, Estonia : proceedings 2010 / p. 187-190 : ill

Non-destructive eddy current measurements for silicon carbide heterostructure analysis

Sahakyan, Armen; Koel, Ants; Rang, Toomas Materials and contact characterisation VIII 2017 / p. 49-60 : ill <https://doi.org/10.2495/MC170061> [Conference proceedings at Scopus](#) [Article at Scopus](#)

Numerical analysis of the influence of deep energy level traps in SiC Schottky structures

Koel, Ants; Rang, Toomas; Rang, Galina High performance structure and materials. VI 2012 / p. 439-448 : ill

Numerical simulation of P-type Al/4H-SiC Schottky barrier diodes [Online resource]

Ziko, Mehadi Hasan; Koel, Ants; Rang, Toomas BEC 2018 : 2018 16th Biennial Baltic Electronics Conference (BEC) : proceedings of the 16th Biennial Baltic Electronics Conference, October 8-10, 2018 2018 / 4 p.: ill <https://doi.org/10.1109/BEC.2018.8600976>

Numerical simulations for reverse recovery process investigations of LPE GaAs power diodes

Koel, Ants; Rang, Toomas; Voitovitš, Viktor; Toompuu, Jana BEC 2012 : 2012 13th Biennial Baltic Electronics Conference : proceedings of the 13th Biennial Baltic Electronics Conference : October 3-5, 2012, Tallinn, Estonia 2012 / p. 39-42 : ill

Numerical study of current crowding phenomenon in complementary 4H-SiC JBS rectifiers

Rang, Toomas; Higelin, G.; Kurel, Raido Silicon Carbide and Related Materials 2003 2004 / p. 1045-1048 <https://www.scientific.net/MSF.457-460.1045>

Numerical study of turn-off phenomenon in complementary 4H-SiC JBS rectifiers

Rang, Toomas; Kurel, Raido; Higelin, G. BEC 2004 : proceedings of the 9th Biennial Baltic Electronics Conference : October 3-6, 2004, Tallinn, Estonia 2004 / p. 47-50 : ill

Numerical two-carrier simulation of the M-S (Schottky) structures

Rang, Toomas Research report : System Theory Laboratory of Electrical Engineering, University of the Saarland 1985 / s. 62

Näidisülesanded. Test : abimaterjal ainele "Mikroelektroonika"

2003 http://www.ester.ee/record=b1766976*est

Odavaid LEDe tasub vältida : [TTÜ Thomas Johann Seebecki elektroonikainstituudis võeti luubi alla valgusdiodide ehk LEDide karakteristikud, tulemusi tutvustab instituudi direktor professor Toomas Rang]

Rang, Toomas; Aru, Erik Mente et Manu 2012 / lk. 8 : fot https://www.ester.ee/record=b1242496*est

One-dimensional numerical simulation of complementary power Schottky structures

Rang, Toomas IEE proceedings. Part I Solid-state and electron devices 1985 / p. 253-256

Open source hardware cost-effective imaging sensors for high-throughput droplet microfluidic systems

Pärnamets, Kaiser; Koel, Ants; Pardy, Tamas; Rang, Toomas Proceedings of 26th International Conference : ELECTRONICS 2022 2022 / 6 p <https://doi.org/10.1109/IEEECONF55059.2022.9810383>

Optical detection methods for high-throughput fluorescent droplet microflow cytometry

Pärnamets, Kaiser; Pardy, Tamas; Koel, Ants; Rang, Toomas; Scheler, Ott; Le Moullec, Yannick; Afrin, Fariha

Micromachines 2021 / art. 345, 20 p. : ill <https://doi.org/10.3390/mi12030345> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Optical dynamics of copper-doped cadmium sulfide (CdS) and zinc sulfide (ZnS) quantum-dots core/shell nanocrystals

Rashid, Muhammad Haroon; **Koel, Ants; Rang, Toomas;** Nasir, Nadeem; Sabir, Nadeem; Ameen, Faheem; Rasheed, Abher Nanomaterials 2022 / art. 2277 <https://doi.org/10.3390/nano12132277> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Panus eilsele teeb homme töötuks

Rang, Toomas Luup 1999 / 9, lk. 24-26 https://artiklid.elnet.ee/record=b2091983*est

A parametric framework for modelling of bioelectrical signals = Parameetiline raamistik bioelektriliste signaalide modelleerimiseks

Muhammad, Yar 2015 http://www.ester.ee/record=b4473232*est

A parametric framework for the development of bioelectrical applications : application to a bio-impedance signal simulator

Muhammad, Yar; Annus, Paul; Le Moullec, Yannick; Rang, Toomas Proceedings of the Estonian Academy of Sciences 2016 / p. 345-357 : ill <https://doi.org/10.3176/proc.2016.4.03> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Parametric simulation of SiC Schottky JBC structures

Rang, Toomas; Kurel, Raido Computer methods and experimental measurements for surface effects and contact mechanics VIII 2007 / p. 315-334 <https://www.witpress.com/Secure/elibrary/papers/SECM07/SECM07030FU1.pdf>

Phenol and methanol detector based on pristine graphene nano-sheet: a first principles study [Online resource]

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas BEC 2018 : 2018 16th Biennial Baltic Electronics Conference (BEC) : proceedings of the 16th Biennial Baltic Electronics Conference, October 8-10, 2018 2018 / 4 p.: ill <https://doi.org/10.1109/BEC.2018.8600982>

Physics related modeling of power LEDs

Paisnik, Kristo; Poppe, Andras; **Rang, Toomas; Rang, Galina** BEC 2012 : 2012 13th Biennial Baltic Electronics Conference : proceedings of the 13th Biennial Baltic Electronics Conference : October 3-5, 2012, Tallinn, Estonia 2012 / p. 57-60 : ill

PID controller tuning optimization using genetic algorithm for droplet size control in microfluidics

Gyimah, Nafisat; Jõemaa, Rauno; Pärnamets, Kaiser; Scheler, Ott; Rang, Toomas; Pardy, Tamas 2022 18th Biennial Baltic Electronics Conference (BEC) 2022 / 6 p <https://doi.org/10.1109/BEC56180.2022.9935596>

Poleemiline järelsõna

Rang, Toomas Mente et Manu 2004 / 30. märts, lk. 2 https://www.ester.ee/record=b1242496*est

Polymer nanofiber deposition in lab-on-a-chip devices by electrospinning

Pardy, Tamas; Jõemaa, Rauno; Ender, Ferenc; **Rang, Toomas;** Hegedus, Kristof; Balogh-Weiser, Diana 2020 17th Biennial

Baltic electronics conference, Tallinn, Estonia, October 6-8, 2020 : proceedings 2020 / 4 p. : ill
<https://doi.org/10.1109/BEC49624.2020.9277494>

Polytypic heterojunctions for wide bandgap semiconductor materials

Shenkin, Mikhail; Korolkov, Oleg; Rang, Toomas; Rang, Galina Materials characterization VII 2015 / p. 273-282 : ill

Pooljuhtstruktuuride tööpõhimõtted. Struktuuride realiseerimised kristallis : abimaterjal ainele "Mikroelektronika"

2003 http://www.ester.ee/record=b1782563*est

Power Stage MOSFETs Segmentation in Ripple Controlled Step-Down SMPS [Online resource]

Mihhailov, Juri; Koort, Marko; Rang, Toomas BEC 2018 : 2018 16th Biennial Baltic Electronics Conference (BEC) : proceedings of the 16th Biennial Baltic Electronics Conference, October 8-10, 2018 2018 / 4 p. : ill <https://doi.org/10.1109/BEC.2018.8600960>

Precision engineering and mechatronics trends in Estonia

Ajaots, Maido; Rang, Toomas; Tamre, Mart NordDesign'96 : 28.-30.8.1996, Helsinki University of Technology, Espoo, Finland : proceedings 1996 / p. 289-296: ill

Preliminary investigation of diffusion welded contacts to p-type 6H-SiC

Korolkov, Oleg; Rang, Toomas; Kuznetsova, Natalja; Ruut, Jana BEC 2002 : proceedings of the 8th Biennial Baltic Electronics Conference : October 6-9, 2002, Tallinn, Estonia 2002 / p. 55-56 : ill

Principles of semiconductor structures. Realisation of structures in crystals : supplementary lecture material in the subject "Microelectronics"

Rang, Toomas 2003 http://www.ester.ee/record=b1782565*est

Process development for 3D laser lithography

Kaste, N.; Filbert, A.; Mescheder, U.; Rang, Toomas; Rang, Galina High performance and optimum design of structures and materials 2014 / p. 139-150 : ill <https://doi.org/10.2495/HPSM140131> [Conference proceedings at Scopus](#) [Article at Scopus](#)

Processing unit for alcohol sensor

Kasemaa, Argo; Rang, Toomas Proceedings of the Conference Electronics'98, 19-20 May 1998, Kaunas, Lithuania 1998 / p. 22-23

Product and manufacturing in electronics : supplementary material in the subject "Technologies of electronic circuits"

Rang, Toomas 2003 https://www.ester.ee/record=b1766953*est

Pungi-, roki- või diskotaat : [Riho Baumannist tema enda, Olavi Pihlamäe ja Toomas Rangi kommentaaridega]

Rebane, Selene-Rete; Pihlamägi, Olavi; Rang, Toomas Üliõpilasleht 2003 / lk. 2 : ill

Pöördumine Haridus- ja Teadusministri ning Riigikogu kultuurikomisjoni esimehe poole : [doktorikoolide probleemist]

Arro, Ilmar; Kaljurand, Mihkel; Kallavus, Urve; Kübarsepp, Jakob; Lille, Ülo; Lopp, Margus; Mellikov, Enn; Min, Mart; Rang, Toomas; Rüstern, Ennu; Taklaja, Andres; Tamm, Toomas; Tammet, Tanel; Tepandi, Jaak; Ubar, Raimund-Johannes; Öpik, Andres Mente et Manu 2005 / 18. mai. lk. 1 https://www.ester.ee/record=b1242496*est

Pöördumine Haridus- ja Teadusministri ning Riigikogu kultuurikomisjoni esimehe poole : [doktorikoolide probleemist]

Arro, Ilmar; Kaljurand, Mihkel; Kallavus, Urve; Kübarsepp, Jakob; Lille, Ülo; Lopp, Margus; Mellikov, Enn; Min, Mart; Rang, Toomas; Rüstern, Ennu; Taklaja, Andres; Tamm, Toomas; Tammet, Tanel; Tepandi, Jaak; Ubar, Raimund-Johannes; Öpik, Andres Tallinna Tehnikaülikooli aastaraamat 2005 2006 / lk. 430-431

Rahvusvaheline Seebecki foorum Tallinnas : [20.-24. mail 2013]

Rang, Toomas Tallinna Tehnikaülikooli aastaraamat 2013 2014 / lk. 303-304

Relative complex permittivity and its dependence on frequency

Giannoukos, Georgios; Min, Mart; Rang, Toomas World journal of engineering 2017 / p. 532-537 : ill <https://doi.org/10.1108/WJE-01-2017-0007> [Journal metrics at Scopus](#) [Article at Scopus](#)

Ränikarbiidil põhinevate jõupooljuhtseadiste disain ja karakteriseerimine

Rang, Toomas; Rang, Galina Teadusmõtte Eestis. 4, Tehnikateadused. 2 2007 / lk. 121-131 : ill

Self-heating phenomenon and current suppressing effect at 6H-SiC Schottky interfaces

Kurel, Raido; Rang, Toomas Proceedings of the 5th NEXUSPAN Workshop on Thermal Aspects in Microsystem Technology, 6-8 May 1998, Budapest, Hungary 1998 / p. 88-91 <https://www.witpress.com/elibary/wit-transactions-on-engineering-sciences/22/5010>

Self-heating phenomenon and current suppressing effect at the SiC Schottky interfaces

Rang, Toomas; Kurel, Raido Software for electrical engineering analysis and design. IV 1999 / p. 153-162: ill

Semiconductor based alcohol sensing element

Rang, Toomas; Kasemaa, Argo Proceedings of the 6th Nexuspan Workshop Microsystems Technology Activities in Baltic Region : 23-24 April, 1999, Vilnius, Lithuania 1999 / p. 82-84

SiC JBS diode symmetrical voltage doubler represented as the diffusion-welded stack

Korolkov, Oleg; Land, Raul; Toompuu, Jana; Sleptšuk, Natalja; Rang, Toomas Silicon carbide and related materials 2017 : ICSCRM 2017 : selected, peer reviewed papers from the 2017 International Conference on Silicon Carbide and related materials, September 17-22, 2017, Washington, DC, USA 2018 / p. 862–865 : ill <https://doi.org/10.4028/www.scientific.net/MSF.924.862> [Conference Proceedings at Scopus](#) [Article at Scopus](#)

SiC Schottky diode for power converters

Pikkov, Mihhail; Rang, Toomas PEDC 2001 : Power Electronics Devices Compatibility : 2nd conference : 3-5 September 2001, Zielona Gora, Poland 2001 / p. 156-161 : ill

SiC Schottky diode for use in power convertors

Pikkov, Mihhail; Rang, Toomas; Pokatilov, Andrei BEC 2006 : 2006 International Baltic Electronics Conference : Tallinn University of Technology, October 2-4, 2006, Tallinn, Estonia : proceedings of the 10th Biennial Baltic Electronics Conference 2006 / p. 245-246 : ill

SiC schottky diode rectifier bridge represented as the diffusion-welded stack

Korolkov, Oleg; Land, Raul; Sleptšuk, Natalja; Toompuu, Jana; Rang, Toomas 11th European Conference on Silicon Carbide and Related Materials : September 25-29, 2016, Porto Carras Grand Resort, Halkidiki, Greece : [poster session] 2016 / p. 42

SiC schottky diode rectifier bridge represented as the diffusion-welded stack

Korolkov, Oleg; Kozlovski, Vitali V.; Lebedev, Alexander A.; Land, Raul; Sleptšuk, Natalja; Toompuu, Jana; Rang, Toomas Silicon Carbide and Related Materials 2016 : selected, peer reviewed papers from the 11th European Conference on Silicon Carbide and Related Materials 2016 (ECSCRM 2016), September 25-29, 2016, Halkidiki, Greece 2017 / p. 697-700 : ill <https://doi.org/10.4028/www.scientific.net/MSF.897.697> [Conference proceedings at Scopus](#) [Article at Scopus](#)

SiC и GaAs диоды в устройствах силовой электроники

Blinov, Andrei; Vinnikov, Dmitri; Rang, Toomas Технічна електродинаміка : тематичний випуск : силова електроніка та енергоефективність 2012 / с. 42-46 : ил

Silicon carbide - new challenge for power semiconductor devices

Rang, Toomas; Rang, Galina 2nd International Symposium "Topical Problems of Education in the Field of Electrical and Power Engineering" : Kuressaare, Estonia, January 17-22, 2005 2005 / p. 36-42 : ill

Silicon integrated circuit fabrication process modeling and simulation

Rang, Toomas; Tarnay, K.; Mizsei, Janos Periodica polytechnica. Electrical engineering = Электротехника 1980 / p. 109-113 https://www.ester.ee/record=b1198855*est

Silicon planar technology process modeling

Rang, Toomas; Tarnay, K.; Masszi, F. Test methods in electronics technology : third International Spring Seminar on Electronics Technology, May 15-18, 1979, Balatonfüred, Hungary 1979 / p. 110-120

Simple relationship between the breakdown voltage, concentration and junction depth pn diffused junctions

Rang, Toomas Physica status solidi. A, Applied research 1982 / p. K117-K119 : tab., joon https://www.ester.ee/record=b1562026*est

Simulation of deep energy traps to explain the VAC temperature dependence anomaly of diffusion welded Schottky contacts

Koel, Ants; Rang, Toomas; Rang, Galina ICSCRM2011 : Cleveland Ohio, USA, September 11-16, 2011 : abstracts 2011 / p. 340 : ill

Simulations of benzene and hydrogen-sulfide gas detector based on single-walled carbon nanotube over intrinsic 4H-SiC substrate

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas; Ziko, Mehadi Hasan Micromachines 2020 / art. 453, 13 p. : ill <https://doi.org/10.3390/mi11050453> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Simulations of graphene nanoribbon field effect transistor for the detection of propane and butane gases : a first principles study

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas Nanomaterials 2020 / art. 98 <https://doi.org/10.3390/nano10010098> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Simulations of heterostructures based on 3C-4H and 6H-4H silicon carbide polytypes

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas Silicon carbide and related materials 2017 : ICSCRM 2017 : selected, peer reviewed papers from the 2017 International Conference on Silicon Carbide and related materials, September 17-22, 2017, Washington, DC, USA 2018 / p. 302-305 : ill <https://doi.org/10.4028/www.scientific.net/MSF.924.302> [Conference Proceedings at Scopus](#) [Article at Scopus](#)

Simulations of propane and butane gas sensor based on pristine armchair graphene nanoribbon

Rashid, Muhammad Haroon; Koel, Ants; Rang, Toomas IOP conference series : materials science and engineering 2018 / art. 012001, 8 p <https://doi.org/10.1088/1757-899X/362/1/012001> [Conference proceedings at Scopus](#) [Article at Scopus](#) [Article at WOS](#)

A smart capless voltage regulator for very high bandwidth A/D and D/A converters in a standard 28nm CMOS process

Kampus, Vahur; Rang, Toomas BEC 2016 : 2016 15th Biennial Baltic Electronics Conference : proceedings of the 15th Biennial Baltic Electronics Conference : Tallinn University of Technology, October 3-5, 2016, Tallinn, Estonia 2016 / p. 43-46 : ill http://www.ester.ee/record=b2150914*est

Some comparative properties of diffusion-welded contacts to 6H and 4H silicon carbide

Korolkov, Oleg; Rang, Toomas Silicon Carbide and Related Materials 2001 : ICSCRM2001 : proceedings of the International Conference on Silicon Carbide and Related Materials 2001, Tsukuba, Japan, October 28 - November 2, 2001. Part 2 2002 / p. 941-944 : ill

Some of comparative properties of diffusion welded contacts to 6H- and 4H-silicon carbide

Korolkov, Oleg; Rang, Toomas International Conference on Silicon Carbide and Related Materials 2001 - ICSCRM2001 - October 28-November 2, 2001 (Epochal Tsukuba, Ibaraki, Japan) : technical digest 2001 / p. 625-626 : ill https://www.researchgate.net/publication/250340293_Some_Comparative_Properties_of_Diffusion-Welded_Contacts_to_6H_and_4H_Silicon_Carbide

Szilícium planar technologiai eljárás számítógépes stimulációja

Rang, Toomas; Tamay, K.; Masszi, F. Finommechanika, mikrotechnika: az Optikai, Akusztikai és Filmtechnikai Egyesület, a Híradástechnikai Tudományos Egyesület és a Méréstechnikai és Automatizálási Tudományos Egyesület lapja 1979 / p. 257-260

Static and dynamic behavior of the SiC complementary JBS structures

Kurel, Raido; Rang, Toomas BEC 2006 : 2006 International Baltic Electronics Conference : Tallinn University of Technology, October 2-4, 2006, Tallinn, Estonia : proceedings of the 10th Biennial Baltic Electronics Conference 2006 / p. 59-62 : ill

Status quo in Estonian electronics industry?

Rang, Toomas; Tamm, Uljas BEC : Baltic Electronics Conference : proceedings of the 4th Biennial Conference, October 9-14, 1994, Tallinn (Estonia). 2 1994 / p. 585-591 : ill https://www.ester.ee/record=b2150914*est

Steady state analysis of the commutating LC filter based dual active bridge for the isolation stage of power electronic transformer [Electronic resource]

Beldjajev, Viktor; Rang, Toomas; Zakis, Janis CPE 2013 : 2013 International Conference on Compatibility and Power Electronics (CPE) : June 5-7, 2013, Ljubljana, Slovenia : conference proceedings 2013 / p. 138-143 : ill [CD-ROM]

Study of surface defects in 4H-SiC Schottky diodes using a scanning Kelvin probe

Mizsei, Janos; **Korolkov, Oleg; Toompuu, Jana; Rang, Toomas** The 9th European Conference on Silicon Carbide and Related Materials : abstract book : St. Petersburg Russia, 2-6 September, 2012 2012 / 2 p. : ill

Study of surface defects in 4H-SiC Schottky diodes using a scanning Kelvin probe

Mizsei, Janos; **Korolkov, Oleg; Toompuu, Jana; Mikli, Valdek; Rang, Toomas** Silicon Carbide and Related Materials 2012 : selected peer reviewed papers from the 9th European Conference on Silicon Carbide and Related Materials (ECSCRM 2012), September 2-6, 2012, St. Petersburg, Russian Federation 2013 / p. 677-680 : ill <https://doi.org/10.4028/www.scientific.net/MSF.740-742.677> [Conference Proceedings at Scopus](#) [Article at Scopus](#) [Conference Proceedings at WOS](#) [Article at WOS](#)

Subcontact layers in LPE structures for forming the ohmic contacts on GaAs semiconductor substrates

Korolkov, Oleg; Voitovits, Viktor; Rang, Toomas Abstract book of 13th American Conference on Crystal Growth and Epitaxy : August 12-16, 2001, Burlington, Vermont, USA 2001 / p. 133

Sulle, abiturient! : Üliõpilaste vastuvõtt 1991. a

Rang, Toomas Tehnikaülikool 1991 / 25. apr., lk. 1-2

Tallinna Tehnikaülikool ja Elcoteq Tallinn AS elektroonikainseneride ettevalmistuse ühisrindel

Rang, Toomas Elektroonika 2000 : VII rahvusvahelise telekommunikatsioonipäeva konverentsi ettekannete materjalid 2000 / lk. 19-20 https://www.ester.ee/record=b1399956*est

Tartu dioditegija trügib ainulaadse tehnoloogiaga maailmaturule : [firma Clifton nõukogu liikme Toomas Rangi kommentaariga]

Paris, Krister; Aru, Erik; **Rang, Toomas** Põhjarannik 2005 / 23. märts, Ärileht, lk. 3

Tehnikateadused. Elektrotehnika

Rang, Toomas Eesti entsüklopeedia. 11, Eesti üld 2002 / lk. 500

Tehnikaülikool võitis EL hanke eurode tuvastamiseks : [intervjuu TTÜ elektroonikainstituudi direktori Toomas Rangiga ja professor Mart Min'iga]

Rang, Toomas; Ummelas, Mart; Min, Mart Mente et Manu 2008 / 30. jaan., lk. 3 https://artiklid.elnet.ee/record=b1118469*est

Tehnikaülikooli rektori järjekordsed valimised, ehk, Kuidas paistavad järgmise rektori ülesanded "altpoolt" vaadatuna

Rang, Toomas Tehnikaülikool 1999 / 22. nov., lk. 4-7: portr

Temperature effects in alloy metal and 6H-SiC substrate Schottky contacts caused by the current suppressing effect

Rang, Toomas; Blum, Alfons Proceedings of the International Conference and Exhibition Micro Materials : MicroMat '97, April 16-18, 1997, Berlin, Germany 1997 / p. 591-596

Temperature influence on current suppressing effect in SiC Schottky diode

Kurel, Raido; Rang, Toomas Abstracts of the 3rd International Conference and Exhibition Micro Materials : MicroMat2000 : April 17-19, 2000, Berlin, Germany 2000 / p. 217-218

Temperature influence on current suppressing effect in SiC Schottky diode

Kurel, Raido; Rang, Toomas Proceedings of the 3rd International Conference and Exhibition Micro Materials : MicroMat2000 : April 17-19, 2000, Berlin, Germany 2000 / p. 1208-1209

The 7th Biennial Conference on Electronics and Microsystem Technology "Baltic Electronics Conference" : BEC 2000 : October 8 - 11, 2000, Tallinn, Estonia : conference proceedings

Rang, Toomas 2000 https://www.ester.ee/record=b2150914*est

The basic parameters of diffusion welded Al Schottky contacts to p- and n-SiC

Korolkov, Oleg; Ruut, Jana; Kuznetsova, Natalja; **Rang, Toomas** Silicon Carbide and Related Materials 2003 2004 / p. 857-860
<https://doi.org/10.4028/www.scientific.net/MSF.457-460.857>

The basic Schottky parameters for combined diffusion welded and sputter metal contacts

Kuznetsova, Natalja; Korolkov, Oleg; Rang, Toomas; Pikkov, Mihhail BEC 2006 : 2006 International Baltic Electronics Conference : Tallinn University of Technology, October 2-4, 2006, Tallinn, Estonia : proceedings of the 10th Biennial Baltic Electronics Conference 2006 / p. 47-50 : ill

The d.c. modeling of I²L with the non-linear circuit analysis program TRANZ-TRAN

Rang, Toomas Periodica polytechnica. Electrical engineering = Электротехника 1981 / p. 103-114 : joon
https://www.ester.ee/record=b1198855*est <https://pp.bme.hu/ee/article/view/4771/3876>

The dependence of reverse recovery time on barrier capacitance and series on-resistance in Schottky diodes

Veher, Oleksandr; Sleptšuk, Natalja; Toompuu, Jana; Korolkov, Oleg; Rang, Toomas Materials and contact characterisation VIII 2017 / p. 15-22 : ill <https://doi.org/10.2495/MC170021> [Conference proceedings at Scopus](#) [Article at Scopus](#)

The electrotechnical and electronics industry

Rang, Toomas Technology policy for improving competitiveness of Estonian industries 1996 / p. 60-65

The measurement and tuning of SiC diode voltage doubler represented as diffusion-welded stack [Online resource]

Toompuu, Jana; Sleptšuk, Natalja; Land, Raul; Korolkov, Oleg; Rang, Toomas BEC 2018 : 2018 16th Biennial Baltic Electronics Conference (BEC) : proceedings of the 16th Biennial Baltic Electronics Conference, October 8-10, 2018 2018 / 4 p.: ill
<https://doi.org/10.1109/BEC.2018.8600963>

The permeable base transistor

Koel, Ants; Nilsson, H.H.; Masszi, F.; Rang, Toomas BEC'98 : the 6th Biennial Conference on Electronics and Microsystems Technology, October 7-9, 1998, Tallinn, Estonia : proceedings 1998 / p. 287-290: ill

The Schottky parameter test for combined diffusion welded and sputter large area contacts

Korolkov, Oleg; Kuznetsova, Natalja; Rang, Toomas; Syrkin, A.; Dmitriev, V. Silicon carbide and related materials 2007 / p. 737-740 <https://www.scientific.net/MSF.556-557.737>

The specificity of solid-phase interaction of aluminium with silicon carbide in the manufacture of diffusion-welded contacts to semiconductor devices

Sleptšuk, Natalja; Korolkov, Oleg; Toompuu, Jana; Rang, Toomas; Mikli, Valdek Elektronika ir elektrotehnika = Electronics and electrical engineering 2012 / p. 45-48 : ill <https://eejournal.ktu.lt/index.php/elt/article/view/2610>

Thermal analysis of a disposable, instrument-free DNA amplification lab-on-a-chip platform

Pardy, Tamas; Rang, Toomas; Tulp, Indrek Sensors 2018 / art. 1812, 13 p. : ill <https://doi.org/10.3390/s18061812> [Journal metrics at Scopus](#) [Article at Scopus](#) [Journal metrics at WOS](#) [Article at WOS](#)

Toode ja tootmine elektroonikas : abimaterjal ainele "Elektroonikaskeemide tehnoloogiad"
2003 http://www.ester.ee/record=b1766950*est

TRANZ-TRAN : mittelineaarsete skeemide analüüsi programm : kasutusjuhend
1983 https://www.ester.ee/record=b1255945*est

TRANZ-TRAN mittelineaarsete skeemide analüüsi programm : kasutusjuhend
1986 https://www.ester.ee/record=b1205915*est

TRANZ-TRAN mittelineaarsete skeemide analüüsi programm : mudelite kirjeldus ja parameetrite määramine
1986 https://www.ester.ee/record=b1205916*est

Tunne kolleegi. Enn Velmre : [intervjuu Enn Velmrega]
Velmre, Enn; Rang, Toomas; Haldre, Eero; Oras, Anne; Min, Mart Avaja 2003 / lk. 3 : fot

Two dimensional modeling of the shunted emitter area for power shepistors
Rang, Toomas; Saul, Indrek Modeling, Simulation and Control 1989 / p. 29-39

Two dimensional modelling of alloy metal Schottky contacts to 6H-SiC substrate
Rang, Toomas; Blum, Alfons Proceedings of the ELECTROSOFT 96, May 28-30, San-Miniato, Italy 1996 / p. 347-356

Vaimust, võimust, traditsioonidest ja internetipõhisest õppest: oma mõtteid ja laenatud tarkust
Rang, Toomas Mente et Manu 2004 / 27. jaan., 10. veebr., 20. veebr., 9. märts, lk. 2 https://artiklid.elnet.ee/record=b1341909*est

Vanamoodi enam ei saa, uutmoodi veel ei oska
Rang, Toomas Profit 2005 / 4, lk. 22 : portr

Võta või jäta!
Rang, Toomas Mente et Manu 2010 / lk. 2 : fot. ; 12. veebr., lk. 3 : fot https://www.ester.ee/record=b1242496*est

Väikesed interpretatsioonid pärastlõunaks
Rang, Toomas A & A 2004 / 3, lk. 4-6 https://artiklid.elnet.ee/record=b1015743*est

Ökonoomsete negatiivse diferentsiaaltakistusega astmete ja elementide disainimine ja optimeerimine
Taniloo, Rainer 2005 https://www.ester.ee/record=b2073482*est

Überblick der Situation in der Deutschen Elektronik- und Informatikindustrie
Rang, Toomas Automation, simulation & measurement : ASM'91 : 3rd biennial conference, Tallinn, October 7-11, 1991. Section S / Tallinn Technical University 1992 / S. 11-25: III

Ülikool ootab ettevõtlikust, efektiivsust ja edukust
Rang, Toomas Mente et Manu 2015 / lk. 8-9 : fot https://artiklid.elnet.ee/record=b2725557*est

Аналитико-численная модель для исследования стационарного непроводящего состояния силовых тиристорov
Velmre, Enn; Rang, Toomas Расчет и проектирование измерительных преобразователей 1983 / с. 57-67 : ил https://www.ester.ee/record=b1288985*est <https://digikogu.taltech.ee/et/Item/4e3815a3-f217-4ae2-9776-1b5ea3c25959>

Зависимость подвижности электронов и дырок от температуры и концентрации примеси в кремнии
Rang, Toomas; Velmre, Enn Анализ и моделирование технических устройств и систем АСУТП 1977 / с. 115-120 : илл https://www.ester.ee/record=b2190987*est <https://digikogu.taltech.ee/et/Item/b7c66054-0b4f-4684-9453-442bc7e6e200>

Инженерное обеспечение САПР элементов РЭА
Rang, Toomas Численные методы и средства проектирования и испытания элементов РЭА : тезисы докладов. Том 1 1987 / с. 13-23 : ил https://www.ester.ee/record=b1273986*est

К расчету максимального напряжения переключения р-п-р-структуры
Velmre, Enn; Rang, Toomas Анализ и моделирование технических устройств и систем АСУТП 1977 / с. 121-126 : илл https://www.ester.ee/record=b2190987*est <https://digikogu.taltech.ee/et/Item/b7c66054-0b4f-4684-9453-442bc7e6e200>

Компараторы с обратной связью
Gallai, S.; Rang, Toomas Машинное проектирование электронных устройств и систем 1988 / с. 92-104

Комплексный подход к системам проектирования элементов полупроводниковой и интегральной электроники
Rang, Toomas Машинное проектирование электронных устройств и систем 1988 / с. 149-165

Козэффициентное ударное ионизации носителей заряда в <100> арсениде галлия
Rang, Toomas; Puusepp, Märt Электронная техника. Серия 2, Полупроводниковые приборы : научно-технический сборник 1987 / с. 98-100 https://www.ester.ee/record=b2160501*est

Критические параметры эквивалентных моделей полупроводниковых приборов
Rang, Toomas Моделирование и управление в системах технической кибернетики 1987 / с. 72-76

Лавинное размножение носителей в кремниевых арсенид-галлиевых и фосфидиндиевых дополнительных PN-переходах
Rang, Toomas; Velmre, Enn Расчет и проектирование систем технической кибернетики 1984 / с. 3-13

Машинное моделирование цепи питания, обеспечивающей инжекторный ток для И²Л схем
Rang, Toomas Расчет и проектирование приборов, устройств и систем технической кибернетики 1981 / с. 15-19 : илл
https://www.ester.ee/record=b1319172*est <https://digikogu.taltech.ee/et/Item/4c9b1559-97b9-4d9b-bac8-6c40840ba442>

Моделирование концентрации носителей заряда в полупроводниках
Rang, Toomas Исследования по прикладной квантовой электронике 1987 / с. 26-36

Моделирование подвижностей носителей. 1, Рассеивание на акустических фоновых и на нейтральной и ионизированной примеси
Rang, Toomas Анализ и синтез сложных систем и цепей с помощью ЭВМ 1986 / с. 103-116

Моделирование подвижностей носителей. 2, Рассеивание на носителях и поверхности, эффект насыщения дрейфовой скорости носителей
Rang, Toomas Анализ и синтез сложных систем и цепей с помощью ЭВМ 1986 / с. 117-130

Моделирование технологического процесса кремниевых силовых полупроводниковых приборов на ЭВМ
Rang, Toomas; Velmre, Enn Синтез и диагностика цифровых устройств и систем 1982 / с. 107-112 : илл
https://www.ester.ee/record=b1328194*est <https://digikogu.taltech.ee/et/Item/feb586e-d7fa-4fbd-bf41-40576a75f94b>

Моделирование транспортных уравнений в полупроводниках
Rang, Toomas Исследования по прикладной квантовой электронике 1987 / с. 37-42

Модель ключа на базе ВТСП
Rang, Toomas; Koel, Ants Tallinna Tehnikaülikooli Toimetised 1990 / lk. 109-116: ill

Модель межсоединений/линии передачи на базе ВТСП
Orro, S.; **Rang, Toomas** Tallinna Tehnikaülikooli Toimetised 1990 / lk. 103-108

Нелинейная зарядовая модель тиристора
Rang, Toomas Измерение и моделирование в электронике 1987 / с. 94-100

Нелинейная модель тиристора для программы анализа цепей
Rang, Toomas Проблемы моделирования и измерения в электронике 1986 / с. 13-19

Низкотемпературный отжиг слаболегированных слоев n-4H-SiC после облучения быстрыми электронами
Korolkov, Oleg; Kozlovski, Vitali; Lebedev, Alexander; Sleptšuk, Natalja; Toompuu, Jana; Rang, Toomas Физика и техника полупроводников 2019 / с. 991-994 <https://doi.org/10.21883/FTP.2019.07.47879.9089>

Программа определения параметров "OPTI"
Rang, Toomas Проблемы моделирования и измерения в электронике 1986 / с. 21-26

Радиотехника
Umborg, Jaak; Hinrikus, Hiie; Meigas, Kalju; Zahharov, Boriss; Taklaja, Andres; Rang, Toomas; Manak, I.S.; Lissenkova, A.M.; Bondarenko, A.N.; Falkova, N.V.; Krusell, Urmas 1987 https://www.ester.ee/record=b1273963*est

Расчет туннельного тока в переходах металл - полупроводник
Rang, Toomas Расчет и проектирование измерительных преобразователей 1983 / с. 69-74 : ил
https://www.ester.ee/record=b1288985*est <https://digikogu.taltech.ee/et/Item/4e3815a3-f217-4ae2-9776-1b5ea3c25959>

Специализированные базы данных для программных средств моделирования и анализа элементов

твердотельной электроники

Orro, S.; Rang, Toomas Машинное проектирование электронных устройств и систем 1989 / с. 20-24

Сравнение разных методов оптимизации

Rang, Toomas Моделирование и управление в системах технической кибернетики 1987 / с. 77-84

Численное моделирование рп-структур с двойной фаски с помощью программы "FAAS"

Rang, Toomas; Nurste, Ivar Измерение и моделирование в электронике 1987 / с. 89-93

Численное моделирование диода шоттки на ЭВМ

Rang, Toomas; Udal, Andres Проблемы моделирования полупроводниковых структур и сложных схем на ЭВМ 1982 / с. 21-31 : ил https://www.ester.ee/record=b1339926*est <https://www.etera.ee/zoom/121726/view?page=3&p=separate&search=true&tool=search>

Численное моделирование мощных диодов Шоттки на ЭВМ

Rang, Toomas; Udal, Andres Известия высших учебных заведений : международный ежемесячный научно-технический журнал. Радиоэлектроника 1983 / с. 92-93 https://www.ester.ee/record=b2768571*est

Численное моделирование технологического процесса изготовления полупроводниковых приборов. Модель диффузии

Nobel, Peter XXVII студенческая научно-техническая конференция вузов Прибалтийских республик, Белорусской ССР и Молдавской ССР, 19-21 апреля 1983 г. : тезисы докладов. Часть 3 1983 / с. 14 https://www.ester.ee/record=b1571572*est

Численное моделирование технологического процесса полупроводниковых приборов

Rang, Toomas Проблемы моделирования полупроводниковых структур и сложных схем на ЭВМ 1982 / с. 33-37 https://www.ester.ee/record=b1339926*est <https://www.etera.ee/zoom/121726/view?page=3&p=separate&search=true&tool=search>

Электротехника и автоматика

Laansoo, Ants; Aarna, Olav; Metsanurm, Margus; Teder, Toomas; Kiitam, Andres; Saks, Eva; Land, Raul; Min, Mart; Rimmel, Ülo; Ronk, Ants; Rang, Toomas 1987 https://www.ester.ee/record=b1221893*est

Электротехника и автоматика

Kukk, Vello; Tamm, Uljas; Pikkov, Otto; Min, Mart; Velmre, Enn; Udal, Andres; Nurste, Ivar; Freidin, Boris; Rang, Toomas; Opotski, Aleksei; Laansoo, Ants; Männama, Vello; Järvalt, Aldur; Gurjanov, Boris; Lavrov, Mihhail; Belkina, I.I.; Plakk, Paul; Plakk, Peeter; Plakk, T. 1987 https://www.ester.ee/record=b1224910*est

Электротехника и автоматика

Rüstern, Ennu; Kevallik, Andres; Kruus, Margus; Salum, Kaja; Berkman, Boriss; Tammemäe, Kalle; Alango, Villem; Kont, Toomas; Ubar, Raimund-Johannes; Lohuaru, Tõnu; Štraube, B.; Elst, G.; Bombik, B.; Viies, Vladimir; Gallai, S.; Rang, Toomas; Laansoo, Ants; Männama, Vello; Pikkov, Otto; Gurjanov, Boris; Opotski, Aleksei; Velmre, Enn 1988 https://www.ester.ee/record=b1256708*est

Электротехника и автоматика

Mägi, Harri; Velmre, Enn; Pikkov, Mihhail; Orro, S.; Rang, Toomas; Gurjanov, Boris; Kruus, Margus; Salum, Kaja; Berkman, Boriss; Kevallik, Andres; Kasirova, Lilia; Kruus, Margus; Ellervee, Peeter; Ubar, Raimund-Johannes; Grigorjeva, Ksenja; Kont, Toomas 1989 https://www.ester.ee/record=b1285446*est

Электротехника и автоматика

Ubar, Raimund-Johannes; Rang, Toomas; Velmre, Enn; Evertson, Teet; Voolaine, A.; Toome, Tõnis; Viilup, Agu; Sudnitsõn, Aleksander; Berkman, Boriss; Rüstern, Ennu; Leis, Paul; Kevallik, Andres; Kruus, Margus; Jüris, A. 1984 https://www.ester.ee/record=b1549179*est

Электротехника и автоматика

Kukk, Vello; Tarnay, K.; Szekely, V.; Baji, P.; Farkas, G.; Masszi, F.; Kerecsen-Rencz, M.; Rang, Toomas; Plakk, Paul; Plakk, Peeter; Plakk, T.; Gurjanov, Boris; Männama, Vello; Laansoo, Ants; Pikkov, Otto; Rudski, V.A.; Köverik, Kait 1986 https://www.ester.ee/record=b1296007*est

Электротехника и автоматика

Mägi, Harri; Rüstern, Ennu; Aarna, Olav; Kiitam, Andres; Land, Raul; Min, Mart; Ronk, Ants; Parve, Toomas; Rang, Toomas; Mahhitko, V.P.; Šendrik, M.G.; Tamm, Boris, inform. 1986 https://www.ester.ee/record=b1296468*est