

Program of MIOMD – IX

Monday, September 8th

8:30 – 8:40

Opening : Joachim Wagner, *Fraunhofer IAF, Freiburg*

Session 1: Diode Lasers		Session chair: J. Meyer
08:40 – 09:10	<u>G. Belenky</u> , L. Shterengas, G. Kipshidze, T. Hosoda, and S. Suchalkin (invited) <i>State University of New York at Stony Brook, USA</i> CW operated type-I GaSb-based diode laser with wavelengths above 3 μm	26
09:10 – 09:40	<u>D. Huffaker</u> (invited) <i>University of California, USA</i> Growth of III-Sb diode lasers on GaAs and Si	
09:40 – 10:00	<u>T. Lehnhardt</u> , M. Hümmer, K. Rössner, M. Müller, S. Höfling, and A. Forchel <i>Technische Physik, Physikalisches Institut, Universität Würzburg, Germany</i> Continuous wave single mode operation of GaInAsSb/GaSb quantum well lasers emitting beyond 3 μm	28
10:00 – 10:20	<u>J.A. Gupta</u> , P.J. Barrios, J. Lapointe, G.C. Aers, A. Bezinger, P. Waldron, and C. Storey <i>Institute for Microstructural Sciences, Canada</i> Single-mode InGaAsSb/AlGaAsSb lasers for gas sensing	30

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Coffee break

Session 2: QC Lasers I		Session chair: A. Baranov
10:40 – 11:10	<u>W.T. Masselink</u> , M.P. Semtsiv, M. Wienold, M. Chashnikova, and I. Bayrakli (invited) <i>Humboldt University Berlin, Germany</i> Short-wavelength InP-based QCLs	33
11:10 – 11:30	<u>A. Wittmann</u> , A. Hugi, Y. Bonetti, M. Fischer, E. Gini, and J. Faist <i>Institute of Quantum Electronics, ETH Zürich, Switzerland</i> High performance single-mode and broadly tunable quantum cascade laser sources	34
11:30 – 11:50	<u>S.Y. Zhang</u> , D.G. Revin, J.W. Cockburn, M. Steer, K. Kennedy, A.B. Krysa, and M. Hopkinson <i>University of Sheffield, UK</i> High performance ~3 μm strain balanced InGaAs-AlAsSb/InP quantum cascade lasers	37
11:50 – 12:10	Y. Li, <u>A. Li</u> , L. Wei, H. Li, G. Xu, and Y. Zhang <i>State Key Laboratory of Functional Materials for Informatics, Shanghai, China</i> Distributed feedback quantum cascade lasers operating at 420 K	38
12:10 – 12:30	<u>A. Bismuto</u> , T. Gresch, and J. Faist <i>Institute for Quantum Electronics, Zürich, Switzerland</i> Large cavity quantum cascade lasers with InP interstacks	40

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Session 3: Spectroscopic Sensing		<i>Session chair: F. Genty</i>
14:00 – 14:30	<u>E. Normand</u> (invited) <i>Cascade Technologies, UK</i> MIR spectroscopic sensing	
14:30 – 14:50	<u>F.K. Tittel</u> , Y. Bakirkin, R.F. Curl, A. Kosterev, R. Lewicki, D. Thomasz, S. So, and G. Wysocki <i>Rice Quantum Institute, Houston, USA</i> Recent advances of infrared semiconductor laser based chemical sensing technologies	42
14:50 – 15:10	<u>F. Fuchs</u> , B. Hinkov, Ch. Wild, Q.K. Yang, W. Bronner, K. Köhler, and J. Wagner <i>Fraunhofer-Institut IAF, Freiburg, Germany</i> Quantum cascade lasers for imaging backscattering detection of explosives	44
15:10 – 15:30	<u>J. Hildenbrand</u> , J. Herbst, C. Bühler, J. Wöllenstein, and A. Lambrecht <i>Fraunhofer-Institut IPM, Freiburg, Germany</i> Explosive detection using mid-infrared transmission spectroscopy	46

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Coffee break and Poster session

Session 4: Detectors I		<i>Session chair: L. Wilson</i>
17:30 – 18:00	<u>R. Rehm</u> (invited) <i>Fraunhofer-Institut IAF, Freiburg, Germany</i> QWIP and superlattice dual-band and dual-color FPAs: state of the art and applications	48
18:00 – 18:20	<u>S. Krishna</u> , E. Plis, H.S. Kim, G. Bishop, A. Khoshakhlagh, Y. Sharma, R. Dawson, A. Reisinger, and M. Sundaram <i>Center for High Technology Materials, University of New Mexico, USA</i> Type-II strain layer superlattice focal plane arrays using an nBn design	50
18:20 – 18:40	<u>F. Felder</u> , M. Rahim, M. Fill, M. Arnold, H. Zogg, N. Quack, S. Blunier, and J. Dual <i>Thin Film Physics Group, ETH Zürich, Switzerland</i> Mid-infrared tunable resonant cavity enhanced detectors	52
18:40 – 19:00	<u>B.A. Matveev</u> , A.L. Zakgeim, N.V. Zotova, N.D. Il'inskaya, S.A. Karandashev, M.A. Remenny, N.M. Stus, and A.E. Cherniakov <i>Ioffe Physico-Technical Institute RAS, St. Petersburg, Russia</i> InAs(Sb) backside illuminated photodiodes and LEDs with deep mesa	54

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Discover Freiburg ☺

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Session 5: Interband Lasers		Session chair: A. Li
08:30 – 09:00	<u>A. Monakhov</u> <i>Ioffe Physico-Technical Institute RAS, St. Petersburg, Russia</i> MIR whispering gallery mode lasers	(invited) 57
09:00 – 09:20	<u>A.P. Astakhova</u> , A.M. Monakhov, V.V. Sherstnev, E.A. Grebenshchikova, Y.P. Yakovlev, G. Boissier, R. Teissier, and A.N. Baranov <i>Physico-Technical Inst., Russian Academy of Sciences, St. Petersburg, Russia</i> Experimental observation of whispering gallery modes in sector cylindrical lasers	58
09:20 – 09:40	C.S. Kim, C.L. Canedy, W.W. Bewley, M. Kim, J.R. Lindle, J. Abell, I. Vurgaftman, and <u>J.R. Meyer</u> <i>Naval Research Laboratory, Washington, USA</i> Above-room-temperature cw operation of interband cascade lasers	60
09:40 – 10:00	L. Xue, S.R.J. Brueck, <u>R. Kaspi</u> , A.P. Ongstad, G.C. Dente <i>University of New Mexico, USA</i> Tunable optically pumped mid-IR laser with chirped distributed-feedback grating	62
10:00 – 10:20	<u>A.P. Ongstad</u> , R. Kaspi, G.C. Dente, and M.L. Tilton <i>Air Force Research Laboratory, Kirtland, USA</i> Wavelength tuning limitations in optically pumped type-II antimonide lasers	64

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Coffee break

Session 6: QC Lasers II		Session chair: G. Belenky
10:40 – 11:10	O. Cathabard, J. Devenson, R. Teissier, and <u>A.N. Baranov</u> <i>IES, Université Montpellier 2, France</i> InAs quantum cascade lasers	(invited) 67
11:10 – 11:30	I.P. Marko, A.R. Adams, <u>S.J. Sweeney</u> , R. Teissier, A.N. Baranov, and S. Tomic <i>Advanced Technology Institute, University of Surrey, UK</i> Indirect carrier leakage in short-wavelength InAs/AlSb quantum cascade lasers	68
11:30 – 11:50	<u>A.J. Hoffman</u> , M.D. Escarra, S.S. Howard, K.J. Franz, X.J. Wang, J.Y. Fan, and C. Gmachl <i>Princeton University, USA</i> Strategies for improved wall-plug efficiency in quantum cascade lasers	70
11:50 – 12:10	<u>E. Mujagic</u> , S. Schartner, L.K. Hoffmann, M. Austerer, W. Schrenk, A.M. Andrews, P. Klang, M.P. Semtsiv, W.T. Masselink, and G. Strasser <i>Institute of Solid State Electronics, Vienna University of Technology, Austria</i> Second generation surface emitting distributed-feedback quantum cascade lasers	72
12:10 – 12:30	<u>G. Chen</u> , C.G. Bethea, and R. Martini <i>Department of Physic and Engineering Physics, Stevens Institute of Technology, Hoboken, USA</i> High speed all optical modulation of quantum cascade laser	74

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Session 7: Fibers and Applications		Session chair: F. Tittel
14:00 – 14:30	<u>J.-L. Adam</u> , V. Nazabal, J. Trolès, C. Boussard, L. Brilland, B. Bureau (invited) <i>Equipe Verres et Céramiques, Université de Rennes, France</i> Mid-infrared glass optical fibers	76
14:30 – 14:50	<u>V. Artyushenko</u> , G. Colquhoun, V. Lobachov, T. Sakharova, and D. Savitskij <i>Fibre Photonics Ltd., West Lothian, Scotland</i> Mid IR-fiber optics for fiber spectroscopy systems	78
14:50 – 15:10	<u>P. Fuchs</u> , J. Seufert, J. Koeth, J. Semmel, S. Höfling, and A. Forchel <i>Nanoplus GmbH, Gerbrunn, Germany</i> Widely tunable quantum cascade lasers for sensing applications	80
15:10 – 15:30	<u>A. Garnache</u> , M. Myara, L. Cerutti, A. Ouvrard, J.-P. Perez, A. Ducanchez, A. Laurain, A. Bouchier, and P. Signoret <i>Institut d'Electronique du Sud, Université Montpellier 2, France</i> Single-frequency low-noise broadly-tunable extended-cavity VCSEL for gas analysis in the MIR	82
15:30 – 15:50	<u>B. Grouiez</u> , B. Parvite, N. Dumelie, L. Joly, and V. Zeninari <i>Groupe de Spectrom. Moléculaire et Atmosphérique, UMR CNRS, Reims, France</i> Quantum cascade laser spectroscopy with intermediate-size pulses : application to NH₃ detection in the 10 µm region	85

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Coffee break

Session 8: Detectors II		Session chair: R. Rehm
16:10 – 16:40	<u>L. Wilson</u> (invited) <i>Department of Physics and Astronomy, Univ. of Sheffield, UK</i> Recent advances in quantum-dot-in-a-well infrared photodetectors	
16:40 – 17:00	<u>D. Hofstetter</u> , F.R. Giorgetta, E. Baumann, M. Fischer, and J. Faist <i>University of Neuchâtel, Institute of Physics, Neuchâtel, Switzerland</i> Quantum cascade detectors in the mid-infrared	86
17:00 – 17:20	<u>H. Schneider</u> , S. Winnerl, H.C. Liu, O. Drachenko, M. Helm, and M. Walther <i>Institute of Ion-Beam Physics and Materials Research, Forschungszentrum Dresden Rossendorf, Germany</i> Quadratic detection and autocorrelation measurements with two-photon quantum well infrared photodetectors	88
17:20 – 17:40	A. Gomez, <u>V. Berger</u> , N.P. Laperne, and L.A. De Vaultchier <i>Laboratoire MPQ, Université de Paris, France</i> Barrier breakdown in a quantum well infrared detector	91
17:40 – 18:00	M.P. Mikhailova, <u>I.A. Andreev</u> , K.D. Moiseev, E.V. Ivonov, E.A. Grebenshikova, Y.u.P. Yakovlev, E. Hulicius, A. Hospodkova, J. Pangrac, K. Melichar, and T. Simecek <i>Ioffe Physico-Technical Institute RAS, St. Petersburg, Russia</i> Mid-infrared photovoltaic detectors based on a type-II p-InAs/AlSb/InAsSb/AlSb/p(n)-GaSb heterostructure with deep quantum wells at the interface	93

19:30 Departure for Conference Dinner

20:00 Conference Dinner at the restaurant “Löwen” in Vörsstetten

Wednesday, September 10th

Session 9: V(E)CSEL I		Session chair: J. Wagner
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09:00 – 09:30	<u>S.W. Koch</u> , C. Brückers, A. Thränhardt, J. Hader, and J.V. Moloney, (invited) <i>Department of Physics and Material Sciences Center, Philipps-University Marburg, Germany</i> Microscopic modelling of long-wavelength laser materials and VECSELs	96
09:30 – 10:00	<u>G. Springholz</u> (invited) <i>Institut of Semiconductor Physics, Johannes Kepler Universität Linz, Austria</i> IV-VI VCSELs	

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Coffee break

Session 10: V(E)CSEL II		Session chair: A. Tropper
10:30 – 11:00	<u>A. Bachmann</u> ^{*1} , K. Kashani-Shirazi, M.-C. Amann, <u>F. Genty</u> ^{*2} , (invited) L. Cerutti, A. Ducanchez, P. Grech, and E. Tournié ^{*1} <i>Walter Schottky Institut, Garching, Germany,</i> ^{*2} <i>Université Montpellier 2, France</i> Recent progress on electrically-pumped GaSb-based VCSELs emitting above 2 μm for sensing applications	98
11:00 – 11:30	<u>D. Burns</u> ^{*1} and <u>M. Rattunde</u> ^{*2} (invited) ^{*1} <i>Institut of Photonics, University of Strathclyde, Glasgow, UK,</i> ^{*2} <i>Fraunhofer-Institut IAF, Freiburg, Germany</i> High-power GaSb-based optically pumped semiconductor disk laser for the 2.X μm wavelength regime	100
11:30 – 11:50	<u>M. Rahim</u> , F. Felder, M. Fill, D. Boye, M. Arnold, and H. Zogg <i>Thin Film Physics Group, ETH Zürich, Switzerland</i> 5 μm vertical external cavity surface emitting lasers grown on BaF₂ and Si substrates	102
11:50 – 12:10	<u>J.-M. Hopkins</u> , A.J. Kemp, B. Rösener, N. Schulz, M. Rattunde, J. Wagner, and D. Burns <i>Institut of Photonics, University of Strathclyde, Glasgow, UK</i> High-power, pulsed-pumped, 2.0 μm semiconductor disk laser	104
12:10 – 12:30	<u>B. Rösener</u> , N. Schulz, M. Rattunde, R. Moser, C. Manz, K. Köhler, and J. Wagner <i>Fraunhofer-Institut IAF, Freiburg, Germany</i> 2.25 μm optically pumped semiconductor disk laser using multiple gain elements	106

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Session 11: Detectors and Emitters		Session chair: G. Springholz
14:00 – 14:30	<u>Y.G. Zhang</u> , Y. Gu, Z.-B. Tian, K. Wang, Y.-I. Zheng, and A.-Z. Li (invited) <i>Shanghai Institute of Microsystems and Information Technology, Chinese Academy of Sciences, Shanghai, China</i> 2.4 ~ 2.7 μm metamorphic InGaAs photodetectors	109
14:30 – 14:50	<u>K.J. Franz</u> , W.O. Charles, A. Shen, A.J. Hoffman, M.C. Tamargo, and C. Gmachl <i>Princeton University, New Jersey, USA</i> Quantum cascade electroluminescence from a ZnCdSe/ZnCdMgSe on InP structure	110
14:50 – 15:10	<u>V.A. Solov`ev</u> , P. J. Carrington, Q. Zhuang, A.A. Sitnikova, S.V. Ivanov, and A. Krier <i>Department of Physics, Lancaster University, Lancaster LA1 4YB, UK</i> Room-temperature electroluminescence at 3.8 μm from InSb/InAs quantum dot light-emitting diodes	112
15:10 – 15:30	<u>M. Eibelhuber</u> , T. Schwarzl, W. Heiss, G. Springholz <i>Institut of Semiconductor Physics, Johannes Kepler Universität Linz, Austria</i> Optically pumped mid-infrared IV-VI microdisk lasers operating in continuous-wave at 5.3 μm	114
15:30 – 15:50	<u>J. Gilly</u> , P. Friedmann, J. Schleife, R. Moritz, M. Rattunde, M. Haag, and M. Kelemen <i>m2k-laser GmbH, Freiburg, Germany</i> High-power diode laser bars for the 1.85 to 2.25 μm wavelength range	116
15:50 – 16:10	<u>M. Eichhorn</u> , M. Rattunde, and J. Wagner <i>French-German Research Institute ISL, Saint-Louis, France</i> Pulsed GaSb-based laser diodes seeding 2 μm fiber amplifiers	118
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Poster Session of MIOMD – IX

Monday, September 8th 15:30 – 17:30

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P2	<p>Grating-coupled mid-infrared external-cavity InGaAs/InAlAs/AlAs quantum-cascade lasers <u>I. Bayrakli</u>, M.P. Semtsiv, M. Wienold, M. Hempel, and W.T. Masselink Humboldt University Berlin, Germany Mid-infrared diode lasers based on pentanary GaInAsSbP alloys grown by LPE <u>M. Yin</u>, A. Krier, P.J. Carrington, and N. Cook <i>Physics Department, Lancaster University, UK</i></p>	124
P3	<p>Impact of the injector doping on the performance of InGaAs-InAlAs/InP quantum cascade laser <u>M. Chashnikova</u>, M. Wienold, M. Hempel, M. Klinkmüller, M.P. Semtsiv, and T.W. Masselink <i>Department of Physics, Humboldt Universität Berlin, Germany</i></p>	126
P4	<p>Determination of thermal properties of mid infrared quantum cascade lasers <u>M. Wienold</u>, M.P. Semtsiv, I. Bayrakli, W.T. Masselink, M. Ziegler, K. Kennedy, R. Hogg <i>Department of Physics, Humboldt Universität Berlin, Germany</i></p>	128
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P6	<p>InAs/GaSb/InSb short-period superlattice diode lasers emitting near 3.3 μm at room temperature <u>A. Gasseng</u>, L. Cerutti, A.N. Baranov, and E. Tournié <i>Université Montpellier 2, CNRS, Montpellier, France</i></p>	132
P7	<p>Compressively Strained InGaSb/InAlGaSb quantum well lasers G.R. Nash, S.J.B. Przeslak, S.J. Smith, C.J. Storey, S.D. Coomber, L. Buckle, A.D. Andreev, A. Krier, M. Yin, P. Carrington, M.T. Emeny, and T. Ashley <i>QinetiQ, Worcestershire, UK</i></p>	134
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