

# ARTIFICIAL VISION 2024

THE INTERNATIONAL  
SYMPOSIUM  
ON VISUAL  
PROSTHETICS

Thursday, 5<sup>th</sup> – Friday, 6<sup>th</sup> December, 2024  
Aachen, Germany

## FINAL PROGRAMME

14 CME-POINTS

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[www.artificial-vision.org](http://www.artificial-vision.org)

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The Deutsche Forschungsgemeinschaft DFG supports the meeting with EUR 20.000,-. The financial support of these eight companies adds to the budget of Artificial Vision 2024 financing the costs of this conference, i.e. printing costs, postage, bank fees, rental costs of the congress venue, technical equipment, catering, travel expenses and accommodation for invited speakers, web design, insurances, certification fees, PCO etc.

Dear Colleagues and Friends,

it is my great pleasure to invite you all to the 2024 Artificial Vision Conference in Aachen, Germany.

Although, many wonderful ideas how to design a visual neuroprosthesis for the blind had been developed in the past and enormous work was done in many labs, institutes, and clinics around the globe, the sustainable realization of a product providing useful vision for the patients is still not achieved. Clinical trials have been performed on several products in the past with moderate to good success, but it turned out that it is extremely difficult for companies to remain well financed for continuously pursuing research, development, fabrication, service, rehab, clinical trial sponsoring, and many other aspects.

Many lessons have been learned so far and although the translation is still a big problem, the enthusiasm of many researchers to continue the quest for a better visual prosthesis is still unbroken.

The challenge, to restore vision in blind patients remained a big task, but over the years, we learned a lot about how to interface the visual system with new materials and electrode designs. We learned how to provide data and energy for high density systems and for larger implants. AI based algorithms for data processing of the visual input shortly opened new possibilities and the design of stimulus patterns based on simultaneous recording of retinal or cortical activity may also be a wonderful approach to achieve useful percepts with future implants.

Artificial Vision 2024 in Aachen, Germany is the best opportunity to discuss all these new aspects of Visual Neuroprosthetics with colleagues and friends from all over the world.

Sincerely and on behalf of the organizing committee



A handwritten signature in blue ink, consisting of a large 'P' and 'W' followed by a horizontal line and a small flourish.

**Dr. Peter Walter**  
Professor of Ophthalmology  
RWTH Aachen University

**Scientific programme and further information****Prof. Dr. Peter Walter**

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**Organization**

**Congress-Organisation Gerling GmbH**  
Wertstraße 23, 40549 Düsseldorf, Germany  
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E-Mail: [info@congresse.de](mailto:info@congresse.de), Homepage: [www.congresse.de](http://www.congresse.de)

**Venue**

**Novotel Aachen City**  
Peterstraße. 66, 52062 Aachen, Germany

**Official Language**

English

**Date**

Thursday, December 5<sup>th</sup>, 2024, 12:30 h - 18:30 h  
Friday, December 6<sup>th</sup>, 2024, 09:00 h - 17:30 h

**Opening hours congress office**

Thursday, December 5<sup>th</sup>, 2024, 11:30 h - 18:30 h  
Friday, December 6<sup>th</sup>, 2024, 08:30 h - 17:30 h

**Opening hours industrial**

Thursday, December 5<sup>th</sup>, 2024, 12:30 h - 18:30 h  
Friday, December 6<sup>th</sup>, 2024, 09:00 h - 13:50 h

**Homepage and Online Registration**

[www.artificial-vision.org](http://www.artificial-vision.org)

**Hotel Booking**

We blocked several rooms in the Novotel Aachen City from December 4 to December 7, 2024. Please contact the reservation department and refer to the code „Artificial Vision“: Phone No.: +49 (0)89 121 406 255  
E-mail: [aachen.reservierung@accorhotels.com](mailto:aachen.reservierung@accorhotels.com)

**ATTENDANCE FEE**

Registration	Until 4 <sup>th</sup> Dezember	On site
International symposium attendance fee	EUR 300,-	EUR 320,-
Reduced rate for PhD students and residents*	EUR 150,-	EUR 170,-

\*PhD Students and residents must supply a letter of verification as proof of training. The letter has to be sent to the congress organization prior to the meeting.

The attendance fee covers the costs for coffee breaks, lunch, and the conference dinner (accompanying person EUR 50,-). Incl. VAT and excl. foreign transfer fees

**Payment**

by bank transfer (bank details are quoted on your confirmation and invoice. Please do not transfer money without noting your invoice number!), PayPal or by credit card: VISA, AMERICAN EXPRESS, MASTERCARD

**Important notes for participants**

The attendance fee covers the costs for coffee breaks, lunch, and the conference dinner. If you register late or on-site we cannot guarantee for lunch and participation in the social program.

You are encouraged to apply for the meeting either online.

Cancellation for the symposium has to be made via e-mail or via fax (+49 (0) 2 11 / 59 35 60) by December 1st, 2024. In any case an administration fee of EUR 22,- has to be paid. After this date no refunds can be made.

Changes, errors and misprints excepted.

**CME-POINTS**

The Symposium is certified by the Ärztekammer Nordrhein providing 7 CME-points for each day for the German Continuing Medical Education System.

For the german participants: Bitte geben Sie ihre EF-Nummer bei der Onlineanmeldung an, damit wir die Punkte an die Ärztekammer melden können.

An equivalent Certificate of Attendance will be given to you upon on-site registration.

**INFORMATION FOR SPEAKERS****Presentations**

V 10 min presentation + 5 min discussion

KV 5 min presentation + 2 min discussion

**Projection**

Microsoft PowerPoint presentation on CD-R/DVD/flash drive or own notebook.

Video codec: Quicktime 7.7.9®, Windows Media Player 12.0®

**SOCIAL EVENT****Conference Dinner**

Thursday, December 5<sup>th</sup>, 2024

**19:30 h****Erholungs-Gesellschaft Aachen 1837**

Reihstraße 13  
52062 Aachen

**Price per person**

(incl. dinner and drinks):

Participant – included in the attendance fee, but due to notification

Accompanying person – EUR 50,-



Thursday, 5<sup>th</sup> December, 2024

7 CME-POINTS

12:00 h **Come together**12:30 h *Welcome Notes***Peter Walter** (Organizing Committee)**Veronika Rink** (DFG, Program Chair Microsystem Technology)**Stefan Uhlig** (Dean of the Medical Faculty, RWTH Aachen University)12:45 h - **1<sup>st</sup> Session**14:30 h **Understanding degeneration and regeneration in the visual system**Chairs: **Yiqing Li** (Guangzhou/PRC)**Frank Müller** (Juelich/D)01.01 V **David G. Litvin**<sup>1</sup>, A. Boizot<sup>1</sup>, D.Ghezzi<sup>2</sup>12:45 h (<sup>1</sup>Ophthalmic and Neural Technologies Laboratory, Department of Ophthalmology, University of Lausanne/CH, <sup>2</sup>Hôpital ophtalmique Jules-Gonin, Fondation Asile des Aveugles, Lausanne/CH)*Corneal recordings reveal periodic rhythmic activity in-vivo*01.02 V **Anna Kochnev Goldstein**<sup>1\*</sup>, **S.V. Shah**<sup>2\*</sup>, Z.C. Chen<sup>3</sup>, P. Vasireddy<sup>1</sup>, A.J. Phillips<sup>1</sup>,  
13:00 h M. Bhuckory<sup>3,4</sup>, D. Palanker<sup>3,4</sup>(<sup>1</sup>Department of Electrical Engineering, Stanford University, CA/USA, <sup>2</sup>School of Medicine, Stanford University, CA/USA, <sup>3</sup>Hansen Experimental Physics Laboratory, Stanford University, CA/USA, <sup>4</sup>Department of Ophthalmology, Stanford University, CA/USA, \*These authors contributed equally)*Mapping the Electrical Resistivity of Retinal Layers*01.03 KV **Nruthyathi Nruthyathi**<sup>1</sup>, M. Jung<sup>2</sup>, J. Wang<sup>3</sup>, V. R. Montes<sup>2</sup>, A. Offenhäusser<sup>2</sup>,  
13:15 h A. Willuweit<sup>3</sup>, F. Müller<sup>1</sup>(<sup>1</sup>Institute of Biological Information Processing, Molecular and Cellular Physiology (IBI-1), Forschungszentrum Jülich/D, <sup>2</sup>Institute of Biological Information Processing, Bioelectronics (IBI-3), Forschungszentrum Jülich/D, <sup>3</sup>Institute of Neuroscience and Medicine (INM-4), Forschungszentrum Jülich/D)*Short phases of pathological rhythmic activity similar to rd retinae are also present in retinae of RCS rats*01.04 KV **Mari Bonse**<sup>1</sup>, J. Wang<sup>1</sup>, S. Krause<sup>1</sup>, M. Schöneck<sup>1</sup>, N. Burda<sup>1</sup>, M. Cremer<sup>1</sup>, N. Jon Shah<sup>1,4,5</sup>,  
13:22 h K.-J. Langen<sup>1,8</sup>, B. Kampa<sup>2,4</sup>, F. Müller<sup>3</sup>, A. Willuweit<sup>1</sup>(<sup>1</sup>Institute of Neuroscience and Medicine (INM-4, INM-2, INM-11), Forschungszentrum Jülich/D, <sup>2</sup>Department of Neurophysiology, Institute for Biology II, RWTH Aachen University/D, <sup>3</sup>Institute of Biological Information Processing (IBI-1), Forschungszentrum Jülich/D, <sup>4</sup>JARA BRAIN, Institute for Neuroscience and Medicine, Forschungszentrum Jülich/D, <sup>5</sup>Department of Neurology, RWTH Aachen University/D, <sup>6</sup>Department of Nuclear Medicine, RWTH University Hospital/D)*Distribution of Neurotransmitters in a Retinitis Pigmentosa rodent model*

01.05 KV **Julia Baumann**<sup>1</sup>, D. Holtrup<sup>1</sup>, E. Balla<sup>1</sup>, H. Koch<sup>2</sup>, K. van Loo<sup>2</sup>, S. Rotter<sup>3</sup>, F. Müller<sup>4</sup>,  
13:29 h B. Kampa<sup>1</sup>

(<sup>1</sup>RWTH Aachen University, Department of Neurophysiology/D, <sup>2</sup>Uniklinik Aachen, Department of Neurology/D, <sup>3</sup>University of Freiburg, Bernstein Center Freiburg/D, <sup>4</sup>Forschungszentrum Jülich, Institute of Biological Information Processing (IBI)/D)

*Plug-and-play integration of a new sensory channel in evolution*

01.06 V **Yiqing Li**  
13:36 h (State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University, Guangdong Provincial Key Laboratory of Ophthalmology Visual Science, Guangzhou/PRC)

*Restoring Sight: Zinc, Dopamine, and AR Technology in Glaucoma Recovery*

01.07 KV **Liyan Liu**, J.H. Tang, Q. Zhang, Z. Liu, Y.H. Zhuo, Y.Q. Li  
13:51 h (State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University/PRC)

*The role of sialylation on neuroprotection and optic nerve regeneration*

01.08 KV **Jiahui Tang**, Z. Liu, Y.Q. Li  
13:58 h (State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University/PRC)

*The Role of Mitochondrial Fusion in Optic Nerve Regeneration and Targeted Intervention Strategies*

01.09 KV **Zhe Liu**, J.H. Tang, Q. Zhang, L.Y. Liu, Y.H. Zhuo, Y.Q. Li  
14:05 (State Key Laboratory of Ophthalmology, Zhongshan Ophthalmic Center, Sun Yat-sen University, Guangdong Provincial Key Laboratory of Ophthalmology Visual Science, Guangzhou, Guangdong/PRC)

*The mechanism and targeted therapy of zinc mediating retinal ganglion cell injury through histone H4 deacetylation*

14:15 h - **2<sup>nd</sup> Session**  
15:55 h **New Electrodes**

Chairs: **Karsten Seidl** (Duisburg/D)  
**Daniel Palanker** (Stanford, CA, USA)

02.01 V **Daniel Palanker**<sup>1</sup>, M. Bhuckory<sup>1</sup>, K. Ly<sup>1</sup>, A. Shin<sup>1</sup>, A. Kochnev-Goldstein<sup>1</sup>, N. Jensen<sup>1</sup>,  
14:15h L. Galambos<sup>1</sup>, E. Butt<sup>2</sup>, K. Mathieson<sup>2</sup>, T. Kamins<sup>1</sup>

(<sup>1</sup>Stanford University, CA/USA, <sup>2</sup>University of Strathclyde, Glasgow/UK)

*From clinical proof of concept to high-resolution prosthetic vision*

02.02 V **Tarik Safa Kaya**<sup>1</sup>, H. Nur Kaleli<sup>2</sup>, R. Balamur<sup>3</sup>, A.Önal<sup>4</sup>, Ç. Pehlivan<sup>2</sup>, U. Berkay Çalışkan<sup>3</sup>,  
14:30 h R. Mohajeri<sup>3</sup>, A. Şahin<sup>2,5</sup>, M. Hasanreisoglu<sup>2,5</sup>, S.Nizamoglu<sup>3\*</sup>

(<sup>1</sup>Department of Material Science and Engineering, Koç University, Istanbul/TR, <sup>2</sup>Research Center for Translational Medicine, Koç University, Istanbul/TR, <sup>3</sup>Department of Electrical and Electronics Engineering, Koç University, Istanbul/TR, <sup>4</sup>Department of Biomedical Science and Engineering, Koç University, Istanbul/TR)

*Quantum Dot-Integrated Nanowire Arrays for Photovoltaic Retinal Stimulation in the Near-Infrared*

- 02.03 V **Jisung Kim<sup>1</sup>**, J.S. Lee<sup>2</sup>, C.H. Baek<sup>1</sup>  
14:45 h (1<sup>Department of Transdisciplinary Medicine, Seoul National University of Hospital/ROK, Department of Electrical and Computer Engineering, College of Engineering, Seoul National University/ROK</sup>)  
*Development of a Flexible 60-Channel PFA Film-Based Electrode for High-Resolution Retinal Stimulation*
- 02.04 V **Hwi Ahn**  
15:00 h (Department of Electrical and Computer Engineering, Seoul National University, Seoul/ROK)  
*Neural electrode fabrication using spin-coated cyclic olefin copolymer film*
- 02.05 V **Jiseon Lee<sup>1</sup>**, J. Kim<sup>2</sup>, N. Lee<sup>1</sup>, J. Seo<sup>1,3</sup>  
15:15 h (1<sup>Department of Electrical and Computer Engineering, Seoul National University, Seoul/ROK, 2Department of Transdisciplinary Medicine, Seoul National University Hospital, Seoul/ROK, 3Biomedical Research Institute, Seoul National University Hospital, Seoul/ROK</sup>)  
*Fabrication process of 3D pre-pressed PFA based electrodes for effective stimulation*
- 02.06 KV **Simon Decke<sup>1,2</sup>**, M. Jung<sup>1,2</sup>, J. Abu Shihada<sup>1,2</sup>, L. Koschinski<sup>1,2,3</sup>, S. Musall<sup>1,2,4,5</sup>, V. Rincón Montes<sup>1</sup>, A. Offenhäusser<sup>1</sup>  
15:30 h (1<sup>Institute of Biological Information Processing (IBI-3) - Bioelectronics, Forschungszentrum Jülich/D, 2RWTH Aachen University/D, 3Helmholtz Nano Facility (HNF), Forschungszentrum Jülich/D, 4Faculty of Medicine, Institute of Experimental Epileptology and Cognition Research, University of Bonn/D, 5 University Hospital Bonn/D</sup>)  
*Flexible 3D Microelectrode Arrays with High Aspect Ratio Electrodes for Neuronal Recordings*
- 02.07 KV **Domenic Pascual<sup>1</sup>**, A. Albert<sup>1</sup>, K. Seidl<sup>1,2</sup>  
15:37 h (1<sup>University of Duisburg-Essen, Electronic Components and Circuits, Duisburg/D, 2Fraunhofer Institute for Microelectronic Circuits and Systems, Duisburg/D</sup>)  
*Towards a Flexible Retinal Implant with 3D Needle Microelectrodes through Silicon Ultrathinning and ASIC Integration*
- 02.08 KV **Claire Baum<sup>1\*</sup>**, **P. Vasireddy<sup>1\*</sup>**, P. Wang<sup>1</sup>, A.J. Phillips<sup>1</sup>, K. Affolder<sup>2</sup>, S. Kachiguine<sup>2</sup>, P. Hottowy<sup>3</sup>, A.Sher<sup>2</sup>, A. Litke<sup>2</sup>, E.J. Chichilnisky<sup>1</sup>  
15:44 h (1<sup>Stanford University, CA/USA, 2University of California, Santa Cruz, CA/USA, 3AGH University of Science and Technology, Krakow/PL, \*Equal contributions</sup>)  
*High density penetrating electrodes for three-dimensional neural recording and stimulation at single-cell resolution*
- 15:55 h **Coffee break in the industrial exhibition**

- 16:25 h - **3<sup>rd</sup> Session**  
 18:30 h **New Systems**  
 Chairs: **Yasuo Terasawa** (NIDEK CO., LTD)  
**Eduardo J. Chichilnisky** (Stanford, CA/USA)
- 03.01 V **Yasuo Terasawa**<sup>1,2,3</sup>, H. Tashiro<sup>2</sup>, J. Ohta<sup>3</sup>  
 16:25 h (1 R&D Div., NIDEK CO., LTD., <sup>2</sup>Department of Health Sciences, Faculty of Medical Sciences, Kyushu University/J, <sup>3</sup>Institute for Research Initiatives, Nara Institute of Science and Technology (NAIST))  
*Toward a visual prosthesis featuring 1000+ ch stimulating electrodes by distributed architecture*
- 03.02 V **Mohajeet B. Bhuckory**<sup>1,2</sup>, A. Shin<sup>3</sup>, V. Mamchik<sup>1</sup>, Q. Devaud<sup>1</sup>, D. Pham-Howard<sup>1,2</sup>,  
 16:40 h N. Jensen<sup>4</sup>, A. Kochnev Goldstein<sup>4</sup>, R. Dalal<sup>2</sup> and D. Palanker<sup>1,2</sup>  
 (1Hansen Experimental Physics Laboratory, Stanford, CA/USA, <sup>2</sup>Department of Ophthalmology, Stanford, CA/USA, <sup>3</sup>Department of Material Science, Stanford, CA/USA, <sup>4</sup>Department of Electrical Engineering, Stanford University, CA/USA)  
*Mimicking the subretinal space in atrophic AMD for pre-clinical testing of prosthetic vision*
- 03.03 V **Nathan Jensen**, A. K. Goldstein, K. Ly, D. Palanker  
 16:55 h (Stanford University, CA/USA)  
*Design Optimization of a Subretinal Photovoltaic Prosthesis for Human Anatomy*
- 03.04 KV **Roman Deubel**<sup>1</sup>, S. Johnen<sup>2</sup>, E. Glowacki<sup>3</sup>, Z. Gao<sup>1</sup>, S. Ingebrandt<sup>1</sup>  
 17:10 h <sup>1</sup>Institute of Materials in Electrical Engineering, RWTH Aachen University/D, <sup>2</sup>Department of Ophthalmology, RWTH Aachen University/D, <sup>3</sup>Department of Bioelectronics Materials and Devices, CEITEC/CZ)  
*Advancing Therapeutic Strategies for Retinitis Pigmentosa: Development of a Triple Neuronal Interface*
- 03.05 KV **Kazim Or**  
 17:17 h (Private Ophthalmology Office, Hamburg/D)  
*Li-Fi Data Transmission and Wireless Energy Transmission Perspective in Human Artificial Vision*
- 03.06 KV **Eashika Ghosh**, G. Ziyu, V.T. Xuan, S. Ingebrandt  
 17:24 h (Institute of Materials in Electrical Engineering 1, RWTH Aachen University, Aachen/D)  
*Concept of foldable, active epiretinal implants with enhanced spatial resolution*
- 03.07 KV **Ieva Vebraitė Adereth**, S.Oz, C. Bar-Haim, Y. Hanein  
 17:31 h (School of electrical engineering, Tel Aviv University/IL)  
*Bi-directional recording and stimulation of the retina inside the eye with soft electrodes*
- 03.08 KV **Martin Kasavetov**, E. Yilmaz, L. Koschinski, M. Jung, S. Decke, A. Offenhäuser,  
 17:38 h V. Rincón Montes  
 (Institute of Biological Information Processing (IBI-3) – Bioelectronics, Forschungszentrum Jülich/D)  
*Development of 3D penetrating neural stacks for intraneural recording and stimulation*

- 03.09 KV **Kalyani Devkota**, R. Opgenorth, B. Chowdhury, S. Johnen, S. Ingebrandt, Z. Gao  
17:45 h (RWTH Institut für Werkstoffe der Elektrotechnik I, Aachen/D)  
*Opto-electro and lono-electro active microelectrode as multifunctional platform for neurodegeneration study of the retina*
- 03.10 V **Viviana Rincón Montes**<sup>1</sup>, M. Jung<sup>1,2</sup>, M. Kasavetov<sup>1</sup>, N. Nruthyathi<sup>3</sup>, F. Balcewicz<sup>4</sup>,  
17:52 h T. Lohmann<sup>4</sup>, F. Müller<sup>3</sup>, P. Walter<sup>4</sup>, A. Offenhäusser<sup>1</sup>  
(<sup>1</sup>Institute of Biological Information Processing (IBI-3) - Bioelectronics, Forschungszentrum Jülich/D, <sup>2</sup>RWTH Aachen/D, <sup>3</sup>Institute of Biological Information Processing (IBI-1), Molecular and Cellular Physiology, Forschungszentrum Jülich/D, <sup>4</sup>Department of Ophthalmology, University Hospital RWTH Aachen)  
*A Roadmap to In Vivo Validation of Intraretinal Implants*
- 03.11 KV **Fatemeh Molasarvestani**, E. Ghosh, S. Ingebrandt, X. Thang Vu  
18:07 h (Institute of Materials in Electrical Engineering 1 (IWE1), RWTH Aachen University, Aachen/D)  
*Flexible epiretinal implant with high stimulation electrode count*
- 03.12 V **Madeline Hays**<sup>1</sup>, A.J. Phillips<sup>1</sup>, R. Wijermars<sup>2</sup>, M. Jang<sup>3</sup>, P. Wang<sup>1</sup>, S. Cogan<sup>4</sup>,  
18:14 h D. Muratore<sup>2</sup>, E.J. Chichilnisky<sup>1</sup>  
(<sup>1</sup>Stanford University, CA/USA, <sup>2</sup>Delft University of Technology/NL, <sup>3</sup>National University of Singapore/SGP, <sup>4</sup>University of Texas at Dallas, TX/USA)  
*Evaluation of analog compressive readout architecture for neuroengineering applications using ex vivo recordings from the macaque retina*
- 18:30 h **End of the scientific programme day 1**
- 19:30 h **Conference dinner**

Friday, 6<sup>th</sup> December, 2024

7 CME-POINTS

09:00 h - **4<sup>th</sup> Session**11:20 h **Preclinical Stimulation Studies**Chairs: **Paul Werginz** (Vienna/A)  
**John S. Pezaris** (Boston, MA/USA)04.01 V **Keith Ly**<sup>1,2</sup>, D. Pham-Howard<sup>1,2</sup>, M. B. Bhuckory<sup>1,2</sup>, A.K. Goldstein<sup>3</sup>, N. Jensen<sup>3</sup>, D. Palanker<sup>1</sup>  
9:00 h (<sup>1</sup>Hansen Experimental Physics Laboratory, Stanford, CA/USA, <sup>2</sup>Department of Ophthalmology, Stanford, CA/USA, <sup>3</sup>Department of Electrical Engineering, Stanford University, CA/USA)  
*Selectivity for Bipolar Cell Stimulation by Subretinal Implants*04.02 V **Paul Werginz**, L. Koppenwallner, G. Zeck  
9:15 h (Institute of Biomedical Electronics, TU Wien, Vienna/A)  
*Short pulse stimulation to prevent axonal activation in retinal implants*04.03 KV **Andrea Corna**<sup>1</sup>, G. Zeck<sup>1</sup>  
9:30 h (<sup>1</sup>Institute of Biomedical Electronics, TU Wien, Vienna/A)  
*Selective Sinusoidal Electrical Stimulation of Retinal Ganglion Cells for Visual Prosthetics*04.04 V **Taekyung Lee**<sup>1</sup>, S Hwang<sup>3</sup>, J Lee<sup>1</sup>, J Seo<sup>1,2</sup>, S Jun<sup>3,4,5</sup>  
9:37 h (<sup>1</sup>Department of Electrical and Computer Engineering, Seoul National University/ROK, <sup>2</sup>Biomedical Research Institute, Seoul National University Hospital/ROK, <sup>3</sup>Department of Electronic and Electrical Engineering, Ewha Womans University/ROK, <sup>4</sup>Graduate Program in Smart Factory, Ewha Womans University/ROK, <sup>5</sup>Department of Brain and Cognitive Sciences, Ewha Womans University/ROK)  
*Fabrication of COC-based neural electrodes and performance evaluation via ex vivo stimulation of mouse retinal cells*04.05 V **Hyeonhee Roh**<sup>1,2</sup>, J. Kang<sup>2</sup>, H. Lee<sup>2</sup>, M. Im<sup>1,3,4</sup>  
9:52 h (<sup>1</sup>Brain Science Institute, Korea Institute of Science and Technology (KIST)/ROK, <sup>2</sup>School of Electrical Engineering, College of Engineering, Korea University/ROK, <sup>3</sup>Division of Bio-Medical Science & Technology, KIST School, University of Science and Technology (UST) /ROK, <sup>4</sup>KHU-KIST Department of Converging Science and Technology, Kyung Hee University/ROK)  
*Efficiency of Combined Optogenetic and Electric Stimulation Depending on Amplitude and Waveform of Electric Stimulation in Mouse Retina*04.06 V **Laurens Goyaerts**<sup>1,2</sup>, M. Schelles<sup>1,2</sup>, L. Merken<sup>2,3</sup>, P. Janssen<sup>3</sup>, M. Kraft<sup>1</sup>, F. Ceysens<sup>2</sup>  
10:07 h (<sup>1</sup>Micro- and Nanosystems, Dept. of Electrical Engineering, KU Leuven/B, <sup>2</sup>ReVision Implant, Haasrode/B, <sup>3</sup>Laboratory for Neuro- and Psychophysiology, Dept. of Neuroscience, KU Leuven/B)  
*Pre-clinical cortical prosthesis studies at ReVision Implant*04.07 KV **Jiayun Wang**<sup>1</sup>, T. Lohmann<sup>1</sup>, F. Balcewicz<sup>1</sup>, S. Johnen<sup>1</sup>, Y. Wu<sup>2</sup>, H. Konermann<sup>2</sup>, K. Keven<sup>2</sup>, J. Stegmaier<sup>2</sup>, P. Walter<sup>1</sup>, S. Baumgarten<sup>1</sup>  
10:22 h (<sup>1</sup>Department of Ophthalmology, RWTH Aachen University/D, <sup>2</sup>Institute of Imaging and Computer Vision, RWTH Aachen University/D)  
*Histological effects of cryo and laser coagulation on small animal eyes and anatomical reconstruction in 3D*

- 04.08 V **John S. Pezaris**<sup>1,2</sup>, N. J. Killian<sup>3</sup>  
10:29 h (1Massachusetts General Hospital, Boston, MA/USA, 2Harvard Medical School, Boston, MA/USA, 3Einstein College of Medicine; New York City, NY/USA)  
*Visual exploration of letters in a simulation of artificial vision*
- 04.09 KV **Bisruta Chowdhury**<sup>1</sup>, R. Deubel<sup>1</sup>, H. Koch<sup>2</sup>, S. Ingebrandt<sup>1</sup>, Z. Gao<sup>1</sup>  
10:42 h (1Institute of Materials in Electrical Engineering <sup>1</sup> (IWE1), RWTH Aachen University/D, 2Section of Epileptology, Department of Neurology, RWTH Aachen/D)  
*Development of therapeutic neuro-ophthalmological implants*
- 04.10 KV **Ramandeep Vilkuh**<sup>1</sup>, P. Vasireddy<sup>1</sup>, K. Kish<sup>2</sup>, A. Gogliettino<sup>1</sup>, A. Lotlikar<sup>1</sup>, P. Hottowy<sup>3</sup>, W. Dabrowski<sup>3</sup>, A. Sher<sup>4</sup>, A. Litke<sup>4</sup>, S. Mitra<sup>1</sup>, E.J. Chichilnisky<sup>1</sup>  
10:49 h (1Stanford University, CA/USA, 2University of Michigan, Ann Arbor, MI/USA, 3AGH University of Science and Technology, Krakow/PL, 4University of California, Santa Cruz, CA/USA)  
*Identifying and probing the mechanism of nonlinear current summation during multi-electrode stimulation using a biophysical model*
- 04.11 KV **Amrith Lotlikar**<sup>1</sup>, P. Vasireddy<sup>1</sup>, A. J. Phillips<sup>1</sup>, J. Brown<sup>1</sup>, R. Vilkuh<sup>1</sup>, P. Hottowy<sup>2</sup>, A. Sher<sup>3</sup>, A. Litke<sup>3</sup>, S. Mitra<sup>1</sup>, E.J. Chichilnisky<sup>1</sup>  
10:56 h (1Stanford University, CA/USA, 2AGH University of Science and Technology, Krakow/PL, 3University of California, Santa Cruz, CA/USA)  
*Rapid Calibration of Electronic Epiretinal Implants using Optimized Stimulation and Recording*
- 04.12 V **Andrew J. Phillips**<sup>1</sup>, M. Hays<sup>1</sup>, A. Kling<sup>1</sup>, R. Vilkuh<sup>1</sup>, P. Vasireddy<sup>1</sup>, P. Hottowy<sup>2</sup>, W. Dabrowski<sup>2</sup>, A. Sher<sup>3</sup>, A. Litke<sup>3</sup>, E.J. Chichilnisky<sup>1</sup>  
11:03 h (1Stanford University, CA/USA, 2AGH University of Science and Technology, Krakow/PL, 3University of California, Santa Cruz, CA/USA)  
*Precise reproduction of diverse naturalistic firing patterns in multiple neuronal populations using electrical stimulation*
- 11:20 h **Coffee break in the industrial exhibition**
- 11:50 h - **5<sup>th</sup> Session**  
12:50 h **Encoding, AI**  
Chairs: **Johannes Stegmaier** (Aachen/D)  
**Michael Beyeler** (Santa Barbara, CA/USA)
- 05.01 V **Michael Beyeler**<sup>1</sup>, J. Granley<sup>1</sup>, A. Lozano<sup>2,3</sup>, C. Soto<sup>3</sup>, F. Grani<sup>3</sup>, A. Rodil<sup>3</sup>, E. Fernandez<sup>2</sup>  
11:50 h (1University of California, Santa Barbara, CA/USA, 2Netherlands Institute for Neuroscience, Amsterdam/NL, 3University Miguel Hernandez de Elche/E)  
*Human-in-the-Loop Optimization of Neural Encoding Strategies for Visual Neuroprostheses*
- 05.02 V **Yuli Wu**<sup>1</sup>, D. Nguyen<sup>1</sup>, H. Konermann<sup>1</sup>, R. Yilmaz<sup>1</sup>, P. Walter<sup>2</sup>, J. Stegmaier<sup>1</sup>  
12:05 h (1Institute of Imaging and Computer Vision, RWTH Aachen University/D, 2Department of Ophthalmology, RWTH Aachen University/D)  
*Visual Fixation-based Retinal Prosthetic Simulation*

- 05.03 KV **Henning Konermann<sup>1</sup>**, Y. Wu<sup>1</sup>, P. Walter<sup>2</sup>, J. Stegmaier<sup>1</sup>  
 12:20 h (1Institute of Imaging and Computer Vision, RWTH Aachen University/D, 2Department of Ophthalmology, RWTH Aachen University/D)  
*Beyond Downsampling: Semantic Preservation in Retinal Implant Stimuli*
- 05.04 KV **Nick Lorenz<sup>1</sup>**, L. Heyermann<sup>1</sup>, P. Löhler<sup>1</sup>, A. Albert<sup>1</sup>, A. Erbslöh<sup>2</sup>, K. Seidl<sup>1,3</sup>  
 12:27 h (1 University of Duisburg-Essen, Electronic Components and Circuits, Duisburg/D, 2University of Duisburg-Essen, Intelligent Embedded Systems Lab, Duisburg/D, 3Fraunhofer Institute for Microelectronic Circuits and Systems, Duisburg/D)  
*Conceptual First Draft of Retinal Stimulation Encoding in Computational Environment*
- 05.05 V **Leo Buron<sup>1</sup>**, L. Kaiser<sup>1</sup>, J. Dicke<sup>1</sup>, N. Lorenz<sup>2</sup>, J. Zimmermann<sup>3</sup>, K. Seidl<sup>2</sup>, G. Schiele<sup>1</sup>, A. Erbslöh<sup>1</sup>  
 12:34 h (1University of Duisburg-Essen, Intelligent Embedded Systems Lab, Duisburg/D, 2University of Duisburg-Essen, Department of Electronic Components and Circuits, Duisburg/D, 3University of Pavia, Department of Civil Engineering and Architecture, Pavia/I)  
*How to Enable Embedded Neural Signal Processing in Future Retinal Implants*
- 12:50 h **Lunch break in the industrial exhibition**
- 13:50 h - **6<sup>th</sup> Session**  
 16:05 h **Human Studies**  
 16:05 h Chairs: **Gislin Dagnelie** (Baltimore, MD/USA)  
**Peter Walter** (Aachen/D)
- 06.01 V **Jungyeon Park<sup>1</sup>**, A. K. Goldstein<sup>2</sup>, Y. Zhou<sup>2</sup>, D. Palanker<sup>1,3</sup>  
 13:50 h (1Hansen Experimental Physics Laboratory, Stanford, CA/USA, 2Electrical Engineering, Stanford, CA/USA, 3Ophthalmology, Stanford University, CA, USA)  
*Simulating and enhancing prosthetic vision with PRIMA implants*
- 06.02 V **Takeshi Morimoto**, R. Atsumi  
 14:05 h (Department of advanced visual neuroscience, Osaka university graduate school of medicine/J)  
*The effect of the size of the visual field of a retinal prosthesis on visual recognition.*
- 06.03 V **Nico Marek<sup>1</sup>**, S. Pollmann<sup>1,2</sup>  
 14:20 h (1Department of Psychology, University of Magdeburg/D, 2 Center for Brain and Behavioral Sciences, University of Magdeburg/D)  
*Eye movements support memory-guided search with peripheral scotoma simulation in virtual reality*
- 06.04 V **Roberto Morollón Ruiz**, L. Soo, D. Waclawczyk, J. A. Cueva Garcés, M. M. Ayuso Arroyave, I. Willemsse, E. Fernández  
 14:35 h (Miguel Hernandez University, Elche/E)  
*Evaluating the feasibility of a cortical visual neuroprostheses based on intracortical microelectrodes for Orientation and Mobility Tasks*

- 06.05 V **Ralf Hornig<sup>1</sup>**, Y. Le Mer<sup>2</sup>, M. Muqit<sup>3</sup>, L. Olmos de Koo<sup>4</sup>, J.A. Sahel<sup>5</sup>, D. Palanker<sup>6</sup>, F.G. Holz<sup>7</sup>  
14:50 h (1<sup>La Science, Paris/F, 2</sup>Fondation A. de Rothschild, Paris/F, 3<sup>Moorfields Eye Hospital, London/UK, 4</sup>University of Washington, Seattle, WA/USA, 5<sup>University of Pittsburgh School of Medicine, Pittsburgh, PA/USA, 6</sup>Stanford University, CA/USA, 7<sup>University of Bonn, Bonn/D</sup>)  
*Restoration of Detailed Form Vision with the PRIMA Retinal Implant System*
- 06.06 V **Astrid Jiang<sup>1</sup>**, M.P. Barry<sup>2</sup>, G. Dagnelie<sup>3</sup>, P.R. Troyk<sup>2</sup>  
15:05 h (1<sup>Neuroscience Department, Johns Hopkins University, Baltimore, MD/USA, 2</sup>Pritzker Institute, Illinois Institute of Technology, Chicago, IL/USA, 3<sup>Ophthalmology, Johns Hopkins University, Baltimore, MD/USA</sup>)  
*Phosphene Interactions Among Electrode Groups in Intracortical Visual Prosthesis (ICVP)*
- 06.07 V **Eduardo Fernandez**  
15:20 h (Bioengineering Institute, University Miguel Hernández, Elche/E)  
*Advancements in Cortical Visual Neuroprosthesis:  
Recent Studies in Four Human Volunteers*
- 06.08 V **Gislin Dagnelie<sup>1</sup>**, P. Grant<sup>2</sup>, M.P. Barry<sup>3</sup>, K. Stipp<sup>3</sup>, V.L. Towle<sup>4</sup>, F.T. Collison<sup>2</sup>, F.J. Lane<sup>3</sup>,  
15:35 h K. Stephan<sup>4</sup>, K. Jiang<sup>1</sup>, J.P. Szlyk<sup>2</sup>, P.R. Troyk<sup>3</sup>  
(1<sup>Johns Hopkins University, Baltimore, MD/USA, 2</sup>Chicago Lighthouse, IL/USA, 3<sup>Illinois Institute of Technology, Chicago, IL/USA, 4</sup>University of Chicago, IL/USA)  
*Functional outcomes from the Intracortical Visual Prosthesis (ICVP)*
- 06.09 V **Daniele Re**, R. Ibrahim, S. Oz, A. Sharon, I. Vebraitė Adereth, Y. Hanein  
15:50 h (Tel Aviv University/IL)  
*Towards Wearable Non-invasive Approach to Retina stimulation:  
Phosphene Induction and Temporal Interference Studies*
- 16:05 h **General discussion with coffee break and farewell**
- 17:30 h **End of the meeting**

## International Airports. High Speed Train System

**From Frankfurt:** Take the ICE High Speed train from Frankfurt Airport Station to Cologne Main Station (approx. 1h) and continue to Aachen Main Station (approx. 45-60 min).

**From Düsseldorf:** Take the train from Düsseldorf Airport Station to Düsseldorf Main Station (approx. 10 min) and then continue to Aachen Main Station (approx. 1.5 h).

**From Cologne.** Take the train from Cologne Airport Station to Cologne Main Station (approx. 15 min) and then continue to Aachen Main Station (approx. 45 - 60 min).

From Aachen Main Station take a taxi to Novotel Aachen City.

## By car.

**From Frankfurt Airport** you can drive highway A3 to Cologne and then change to A4 direction to Aachen. At AK Aachen please change to A544 direction Aachen Europaplatz (approx. 3 h).

**From Düsseldorf Airport.** A52 → A61 → A44. Then A544 direction Europaplatz. (approx. 95 km, 1 h)

**From Cologne Airport.** Take the A59, then change to A599 followed by A4 towards Aachen. Then A544 direction Europaplatz. (approx. 82 km, 1 h)



## Meeting address

Novotel Aachen City  
 Peterstraße. 66  
 52062 Aachen  
 Germany

## Aachen and the EUREGIO area

The city of Aachen is the most western city in Germany close to the borders of The Netherlands and Belgium. Aachen has approx. 250,000 inhabitants and the University and the University Hospital are the largest employer here in Aachen. Aachen has a long history and you can still see significant witnesses of a time long ago, such as the cathedral with its beautiful and mystic octagon and the astonishing gothic city hall. But Aachen with its important historic phase of Charlemagne today is a young and vivid town with its university and the many students from various countries in the world. RWTH Aachen University is one of the leading technical universities in Europe with a strong focus on mechanical and electrical engineering but also on information technology and natural sciences. Aachen forms a cultural, industrial and also scientific cross border triangle together with Liege in Belgium and Maastricht in The Netherlands forming the EUREGIO area. Many cooperations exist between the institutions within this area.

The Artificial Vision Meeting is set to the beginning of December. Although the weather might not be perfect – in fact it could be cold and maybe rainy – it is worth to visit the cosy Christmas Market in the city. You should try “Printen”, a local biscuit speciality with a high “addiction” potential.

Aachen is also not far away from Cologne with its huge cathedral and its several concert halls and the province capital Düsseldorf with its important art and fashion scene. You can also reach the European capitals Paris and Brussels by high speed train within a few hours.

There are also many more reasons to come and visit Aachen and we are looking forward to see you.