

# PRIME



2008 PhD Research in Microelectronics and Electronics

## PROCEEDINGS

Istanbul, Turkey  
June 22 – 25, 2008

*Organization*



*Conference Sponsors*

BOĞAZIÇI ÜNİVERSİTESİ VAKFI



TÜBİTAK



IEEE

**intersil**

 **National  
Semiconductor**  
*The Sight & Sound of Information*

 **Springer**

**NXP**  
founded by Philips

 **IEEE  
Circuit and Systems  
Society**

 **BROADCOM.**

 **MKR-IC, Mikroelektronik  
R&D Design Center**  
Mikroelektronik ARGE ve Tasarım Ltd.

## Table of Contents

---

<b>Session Name:</b>	<b>CAD 1</b>	
<b>Session Time / Location:</b>	<b>SUNDAY, JUNE 22 / VYKM 2</b>	
<b>Session Chair:</b>	<b>Sule OZEV, Duke University, USA</b>	
15:30 – 15:50	<i>N. KAHRAMAN, T.YILDIRIM</i> <i>Yildiz Technical University, Istanbul, Turkey</i> <b>"Technology Independent Circuit Sizing for Fundamental Analog Circuits"</b>	P1
15:50 – 16:10	<i>E. DENIZ<sup>1</sup>, G. DUNDAR<sup>2</sup></i> <i><sup>1</sup>Dogus University, Istanbul, Turkey</i> <i><sup>2</sup>Bogazici University, Istanbul, Turkey</i> <b>"Hybrid Approach for Performance Estimation; Embedded Tool for Analog Design Automation Systems"</b>	P5
16:10 – 16:30	<i>E. YAHYA<sup>1,2</sup>, M. RENAUDIN<sup>3</sup></i> <i><sup>1</sup>CIS Group, TIMA Laboratory, Grenoble, France</i> <i><sup>2</sup>Banha High Institute of Technology, Banha, Egypt</i> <i><sup>3</sup>TIEMPO SAS, Grenoble, France</i> <b>"Optimal Asynchronous Linear-Pipelines"</b>	P9
16:30 – 16:50	<i>R. Vural ACAR, T. YILDIRIM</i> <i>Yildiz Technical University, Istanbul, Turkey</i> <b>"Optimization of Integrated Circuits using an Artificial Intelligence Algorithm"</b>	P13
<b>Session Name:</b>	<b>DEVICES</b>	
<b>Session Time / Location:</b>	<b>SUNDAY, JUNE 22 / VYKM 3</b>	
<b>Session Chair:</b>	<b>Peter KENNEDY, Univ. College Cork, Ireland</b>	
15:30 – 15:50	<i>A.O. SEVIM, S. MUTLU</i> <i>Bogazici University, Istanbul, Turkey</i> <b>"Post Fabrication Electric Field Treatment of Polymer Light Emitting and Photovoltaic Devices"</b>	P17
15:50 – 16:10	<i>H. TRANG<sup>1</sup>, R. PATRICE<sup>1</sup>, V. MARIE-HELENE<sup>1</sup>, B. PHILIPPE<sup>2</sup></i> <i><sup>1</sup>CEA/LETI Grenoble, France</i> <i><sup>2</sup>INPG/UJF/CNRS Grenoble, France</i> <b>"Effect of thin Polyimide film on Performance of AlN/SiO<sub>2</sub>/Si SAW Device"</b>	P21
16:10 – 16:30	<i>O. GUL, S.S. KALLEMPUDI, H. BASAGA, U. SEZERMAN, Y. GURBUZ</i> <i>Sabanci University, Istanbul, Turkey</i> <b>"Biosensors For the Detection of Cardiovascular Risk Markers in Human Serum "</b>	P25
16:30 – 16:50	<i>A.T. CIFTLIK, H. KULAH</i> <i>Middle East Technical University, Ankara, Turkey</i> <b>"A Direct Injection Method for Blood Cells into Microchannels from Pure Blood Droplets with Switchable"</b>	P29

**Session Name:** ANALOG DESIGN 1  
**Session Time / Location:** MONDAY, JUNE 23 / VYKM 2  
**Session Chair:** Franco MALOBERTI, University of Pavia, Pavia, Italy

- 09:00 – 09:20 *M. DEI<sup>1</sup>, P. BRUSCHI<sup>1</sup>, M. PIOTTO<sup>2</sup>* P33  
<sup>1</sup>University of Pisa, Pisa, Italy  
<sup>2</sup>IEIT Pisa CNR, Pisa, Italy  
**"A Four Quadrant CMOS Analog Multiplier Based on the Non Ideal MOSFET I-V Characteristics"**
- 09:20 – 09:40 *C. CAKIR, O. CICEKOGLU* P37  
Bogazici University, Istanbul, Turkey  
**"Low-Voltage High-Performance CMOS Current Differencing Buffered Amplifier (CDBA)"**
- 09:40 – 10:00 *R. KEPENEK, I.E. OCAK, H. KULAH, T. AKIN* P41  
Middle East Technical University, Ankara, Turkey  
**"A  $\mu$ g Resolution Microaccelerometer System with A Second-Order  $\Sigma$ - $\Delta$  Readout Circuitry"**
- 10:00 – 10:20 *A. CITO<sup>1,4</sup>, M. De MATTEIS<sup>1</sup>, S. D'AMICO<sup>1</sup>, A. BASCHIROTTA<sup>1</sup>, P. DELIZIA<sup>1</sup>, R. REIS<sup>2</sup>, W. ZHAO<sup>2</sup>, C. AZEREDO-LEME<sup>2</sup>, A. TAVARES<sup>2</sup>* P45  
<sup>1</sup>University of Salento, Salento, Italy  
<sup>2</sup>Chipidea Microelectronica, Portugal  
<sup>3</sup>University of Milano Bicocca, Milano, Italy  
<sup>4</sup>University of Pavia, Pavia, Italy  
**"A CMOS-90nm 15.6mW 20dBm-In-Band-IIP3 Analog Baseband Chain for UWB Receivers"**
- 10:20 – 10:40 *U. GUVENC<sup>1</sup>, A. ZEKI<sup>2</sup>* P49  
<sup>1</sup>UEKAE, Tubitak, Gebze, Turkey  
<sup>2</sup>Istanbul Technical University, Istanbul, Turkey  
**"A New Tunable Linear Current Mirror"**

**Session Name:** SIGNAL PROCESSING  
**Session Time / Location:** MONDAY, JUNE 23 / VYKM 3  
**Session Chair:** Bulent SANKUR, Bogazici University, Turkey

- 09:00 – 09:20 *G. FISCELLI, C. CUCCHIARA, A. DI STEFANO, C. G. GIACONIA* P53  
University of Palermo, Palermo, Italy  
**"Wide Bandwidth Impedance Meter using Low Rate Random Sampling"**
- 09:20 – 09:40 *C. VURAL, S. KAZAN* P57  
Sakarya University, Sakarya, Turkey  
**"Robust Digital Image Watermarking Based on Normalization and Complex Wavelet Transform"**
- 09:40 – 10:00 *A. PARUZEL, E. HERMANOWICZ* P61  
Gdansk University of Technology, Gdansk, Poland  
**"Efficient Fractional Delay Hilbert Transform Filter in the Farrow Structure"**
- 10:00 – 10:20 *V. RATNER, Y.Y. ZEEVI* P65  
Technion, Israel Institute of Technology, Haifa, Israel  
**"Image Representation and Enhancement on Elastic Manifolds"**
- 10:20 – 10:40 *K. AVCI, A. NACAROGLU* P69  
Gaziantep University, Gaziantep, Turkey  
**"A New Window Based on Exponential Function"**

**Session Name:** MODELING  
**Session Time / Location:** MONDAY, JUNE 23 / VYKM 2  
**Session Chair:** A. RODRIGUEZ-VAZQUEZ, Universidad de Sevilla, Spain

- 11:00 – 11:20 *S. LENCI, A. NANNINI, F. PIERI* P73  
*University of Pisa, Pisa, Italy*  
**"A Model for Piezoresistance in Torsional MEMS Springs"**
- 11:20 – 11:40 *T. MAEHNE, A. VACHOUX, Y. LEBLEBICI* P77  
*EPFL, Lausanne, Switzerland*  
**"Development of a Bond Graph Based Model of Computation for SystemC-AMS"**
- 11:40 – 12:00 *M.VASILEVSKI, N. BEILLEAU, H. ABOUSHADY, F. PECHEUX* P81  
*UPMC, Paris, France*  
**"Efficient and Refined Modeling of Wireless Sensor Network Nodes Using SystemC-AMS"**
- 12:00 – 12:20 *E. SALMAN, E.G. FRIEDMAN* P85  
*University of Rochester, Rochester, NY, USA*  
**"Methodology for Placing Localized Guard Rings to Reduce Substrate Noise in Mixed-Signal Circuits"**

**Session Name:** MEMS 1  
**Session Time / Location:** MONDAY, JUNE 23 / VYKM 3  
**Session Chair:** Tayfun AKIN, Middle East Technical University, Turkey

- 11:00 – 11:20 *J.L. LOPEZ, F. TORRES, G. MURILLO, J.GINER, J.TEVA, J.VERD,* P89  
*A.URANGA, G. ABADAL, N.BARNIOL*  
*UAB, Barcelona, Spain*  
**"Double-Ended Tuning Fork Resonator in 0.35um CMOS Technology for RF Applications"**
- 11:20 – 11:40 *Y. D. GOKDEL, B. SARIOGLU, A.D. YALCINKAYA* P93  
*Bogazici University, Istanbul, Turkey*  
**"LED Integrated Miniaturized Polymer MEMS Display"**
- 11:40 – 12:00 *S. A. JAWED<sup>1</sup>, D. CATTIN<sup>2</sup>, N. MASSARI<sup>1</sup>, M. GOTTARDI<sup>1</sup>,* P97  
*A.BASCHIROTTTO<sup>3</sup>*  
*1ITC-IRST, Trento, Italy*  
*2University of Trento, Trento, Italy*  
*3University of Milano – Bicocca, Milano, Italy*  
**"A MEMS Microphone Interface with Force-Balancing and Charge-Control"**
- 12:00 – 12:20 *F. TOY, O. FERHANOGLU, H. TORUN, F. L. DEGERTEKIN\*, H. UREY* P101  
*Koc University, Istanbul, Turkey*  
*\*Georgia Institute of Technology, Atlanta-USA*  
**"MOEMS Thermal Imaging Camera"**

**Session Name:** DIGITAL DESIGN  
**Session Time / Location:** TUESDAY, JUNE 24 / VYKM 2  
**Session Chair:** Yusuf LEBLEBICI, EPFL, Switzerland

- 11:00 – 11:20 *D.J. WILLINGHAM, I. KALE* P105  
*University of Westminster, London, Great Britain*  
**"An Asynchrobatic, radix-four, carry look-ahead adder"**
- 11:20 – 11:40 *H. K. ZRIDA<sup>1</sup>, M. ABID<sup>1</sup>, A. C. AMMRI<sup>2</sup>, A. JEMAI<sup>2</sup>* P109  
*<sup>1</sup>ENIS Institute Sfax University, Tunisia*  
*<sup>2</sup>INSAT, Carthage University, Tunisia*  
**"A YAPI-KPN Parallel Model of a H264/AVC Video Encoder"**
- 11:40 – 12:00 *S. LAABIDI, B. ROBISSON, M. AGOYAN* P113  
*EMSE, Gardanne, France*  
**"An evaluation methodology for the security of cryptosystems"**
- 12:00 – 12:20 *M.M. OZBILEN, M. GOK* P117  
*Mersin University, Mersin, Turkey*  
**"A Multi-Precision Floating-Point Adder"**

**Session Name:** MEMS 2  
**Session Time / Location:** TUESDAY, JUNE 24 / VYKM 3  
**Session Chair:** Hakan UREY, Koc University, Turkey

- 11:00 – 11:20 *A. CABONI<sup>1</sup>, M. BARBARO<sup>1</sup>, A. HOMSY<sup>2</sup>, P. VAN DER WAL<sup>2</sup>, V. LINDER<sup>2</sup>, N. DE ROOIJ<sup>2</sup>* P121  
*<sup>1</sup>University of Cagliari, Cagliari, Italy*  
*<sup>2</sup>Institute of Microtechnology, University of Neuchatel, Switzerland*  
**"Integration of a microfluidic flow cell on a CMOS biosensor for DNA detection"**
- 11:20 – 11:40 *M. YILMAZ<sup>1</sup>, E. ALACA<sup>2</sup>, A.D. YALCINKAYA<sup>3</sup>, Y. LEBLEBICI<sup>4</sup>* P125  
*<sup>1</sup>Columbia University, NY, USA*  
*<sup>2</sup>Koc University, Istanbul, Turkey*  
*<sup>3</sup>Bogazici University, Istanbul, Turkey*  
*<sup>4</sup>EPFL, Lausanne, Switzerland*  
**"Design and Integration of a Bimorph Thermal Microactuator with Electrostatically Actuated Micro Tweezers"**
- 11:40 – 12:00 *A. SUMMANWAR<sup>1,2,3</sup>, F. NEUILLY<sup>2</sup>, T. BOUROUINA<sup>3</sup>* P129  
*<sup>1</sup>Université Paris-Est, Marne la Vallée, France*  
*<sup>2</sup>NXP Semiconductors, Caen, France*  
*<sup>3</sup>ESIEE, Noisy-le-Grand, France*  
**"Elimination of notching phenomenon which occurs while performing deep silicon etching and stopping on an insulating layer"**
- 12:00 – 12:20 *I. SARI, T. BALKAN, H. KULAH* P133  
*Middle East Technical University, Ankara, Turkey*  
**"A Micro Power Generator with Planar Coils on Parylene Cantilevers"**

**Session Name:** CAD 2  
**Session Time / Location:** TUESDAY, JUNE 24 / VYKM 2  
**Session Chair:** Berna ORS YALCIN, Yildiz Technical University, Istanbul, Turkey

- 15:30 – 15:50 *S. BAYAR, A. YURDAKUL* P137  
*Bogazici University, Istanbul, Turkey*  
**"Self-Reconfiguration on Spartan-III FPGAs with Compressed Partial Bitstreams via a Parallel Configuration Access Port (cPCAP) Core"**
- 15:50 – 16:10 *H. PARVEZ, H. MRABET, H. MEHREZ* P141  
*Université Pierre et Marie Curie, Paris, France*  
**"Generic Techniques and CAD tools for automated generation of FPGA Layout"**
- 16:10 – 16:30 *Y. YALCIN<sup>1</sup>, G. DUNDAR<sup>1</sup>, B. M. WILAMOWSKI<sup>2</sup>* P145  
<sup>1</sup>*Bogazici University, Istanbul, Turkey*  
<sup>2</sup>*Auburn University, Alabama, USA*  
**"Design and Optimization of PWL Circuits Used in Fuzzy Logic Hardware"**
- 16:30 – 16:50 *G. Di GUGLIELMO,* P149  
*University of Verona, Verona, Italy*  
**"On the validation of embedded systems through functional ATPG"**
- 16:50 – 17:10 *K. ATASU, T. TODMAN, O. MENCER, W. LUK* P153  
*Imperial College, London, England*  
**"Optimal Implementation of Combinational Logic on Look-up Tables"**

**Session Name:** RF 1  
**Session Time / Location:** TUESDAY, JUNE 24 / VYKM 3  
**Session Chair:** Catherine DEHOLLAIN, EPFL, Lausanne, Switzerland

- 15:30 – 15:50 *V. VALENTA, G. BAUDOIN, M. VILLEGAS* P157  
*ESIEE, Paris, France*  
**"Phase Noise Behaviour of Fractional-N Synthesizers with  $\Delta\Sigma$  Dithering for Multi-Radio Mobile Terminals"**
- 15:50 – 16:10 *M. VOLTTI, T. KOIVISTO, E. TIILIHARJU* P161  
*University of Turku, Turku, Finland*  
**"Statistical performance of IIP2 in Active and Passive Mixers"**
- 16:10 – 16:30 *F. CANNONE, G. AVITABILE, D. CASCELLA* P165  
*Politecnico di Bari, Bari, Italy*  
**"Fully integrated coarse-fine wideband distributed Voltage Controlled Oscillator"**
- 16:30 – 16:50 *M. KAYNAK, I. TEKIN, Y. GURBUZ* P169  
*Sabanci University, Istanbul, Turkey*  
**"A Matching Circuit Tuned, Multi-Band (WLAN and WiMAX), Class – A Power Amplifier Using 0.25 $\mu$ m-SiGe HBT Technology"**
- 16:50 – 17:10 *M. De MATTEIS<sup>1</sup>, S. D'AMICO<sup>1</sup>, A. BASCHIROTTO<sup>1</sup>, P. DELIZIA<sup>1</sup>, C. AZEREDO-LEME<sup>2</sup>, A. TAVARES<sup>2</sup>* P173  
<sup>1</sup>*University of Salento, Salento, Italy*  
<sup>2</sup>*Chipidea Microelectronica, Portugal*  
**"A 90nm-CMOS 1.8mW 87dB-SNR 3rd Order Analog Filter for GSM Receiver"**

Session Name: RF 2  
Session Time / Location: WEDNESDAY, JUNE 25 / VYKM 2  
Session Chair: Barbaros SEKERKIRAN, ETA-IC, Turkey

- 09:20 – 09:40 *S. DANESHGAR, M. P. KENNEDY* P177  
*Univ. of College-Cork, Cork City, Ireland*  
**"Analysis and Design of an LC Oscillator-based Injection-Locked Frequency Divider"**
- 09:40 – 10:00 *C. KLAPF<sup>1</sup>, A. MISSONI<sup>1</sup>, W. PRIBYL<sup>1</sup>, G. HOLWEG<sup>2</sup>, G. HOFER<sup>2</sup>* P181  
*<sup>1</sup>Graz University of Technology, Graz, Austria*  
*<sup>2</sup>Infineon AG, Design Center Graz Graz, Austria*  
**"Analyses and Design of Low Power Clock Generators for RFID TAGs"**
- 10:00 – 10:20 *N. DEMIREL<sup>1</sup>, E. KERHERVE<sup>1</sup>, D. PACHE<sup>2</sup>, R. PLANA<sup>3</sup>* P185  
*<sup>1</sup>IMS, Bordeaux, France*  
*<sup>2</sup>STMicroelectronics R&D Crolles, France*  
*<sup>3</sup>LAAS-CNRS, University of Toulouse, France*  
**"A 24 GHz, 18 dBm Fully Integrated Power Amplifier in a 0.13um SiGe HBT Technology"**
- 10:20 – 10:40 *P.E. THOPPAY, C. DEHOLLAIN, M. J. DECLERCQ* P189  
*EPFL, Lausanne, Switzerland*  
**"Noise analysis in Super-regenerative receiver systems"**

Session Name: SENSOR INTERFACES  
Session Time / Location: WEDNESDAY, JUNE 25 / VYKM 3  
Session Chair: Denis MONTICELLI, NSC

- 09:20 – 09:40 *P. DELIZIA<sup>1</sup>, S. D'AMICO<sup>1</sup>, A. BASCHIROTTO<sup>1,2</sup>* P193  
*<sup>1</sup>University of Salento, Italy*  
*<sup>2</sup>University of Milano Bicocca, Italy*  
**"A Low-Power Readout Circuit for Lab-on-a-chip Applications"**
- 09:40 – 10:00 *A. LOMBARDI<sup>1</sup>, M. GRASSI<sup>1</sup>, L. BRUNO<sup>1</sup>, P. MALCOVATI<sup>1</sup>, A. BASCHIROTTO<sup>2</sup>* P197  
*<sup>1</sup>University of Pavia, Pavia, Italy*  
*<sup>2</sup>University of Milano Bicocca, Italy*  
**"An Interface Circuit for Temperature Control and Read-Out of Metal Oxide Gas Sensors"**
- 10:00 – 10:20 *G. FERRARI, F. GOZZINI, M. SAMPIETRO* P201  
*Politecnico di Milano, Milan, Italy*  
**"Transimpedance amplifier for very high sensitivity current detection over 5MHz bandwidth"**
- 10:20 – 10:40 *M. DEI<sup>1</sup>, P. BRUSCHI<sup>1</sup>, M. PIOTTO<sup>2</sup>* P205  
*<sup>1</sup>University of Pisa, Pisa, Italy*  
*<sup>2</sup>IEIIT Pisa CNR, Pisa, Italy*  
**"Design of CMOS Chopper Amplifiers for Thermal Sensor Interfacing"**

**Session Name:** ANALOG DESIGN 2  
**Session Time / Location:** WEDNESDAY, JUNE 25 / VYKM 2  
**Session Chair:** Ali ZEKI, Istanbul Technical University, Istanbul, Turkey

- 11:00 – 11:20 *F. A. AMOROSO, A. PUGLIESE, G. CAPPUCCINO, G. COCORULLO* P209  
*Universita Della Calabria, Italy*  
**"Slewing Investigation and Improved Design Rules for SC Circuits Employing Two-Stage Amplifiers with Current-Buffer Miller Compensation"**
- 11:20 – 11:40 *A. CITO<sup>1</sup>, M. De MATTEIS<sup>1</sup>, S. D'AMICO<sup>1</sup>, A. BASCHIROTTI<sup>1</sup>, P. DELIZIA<sup>1</sup>, R. REIS<sup>2</sup>, W. ZHAO<sup>2</sup>, C. AZEREDO-LEME<sup>2</sup>, A. TAVARES<sup>2</sup>* P213  
*<sup>1</sup>University of Salento, Salento, Italy*  
*<sup>2</sup>Chipidea Microelectronica, Portugal*  
*<sup>3</sup>University of Milano Bicocca, Milano, Italy*  
*<sup>4</sup>University of Pavia, Pavia, Italy*  
**"A CMOS 90nm 4mW 15dBm-IIP3 Base-band Programmable Gain Amplifier for UWB Receivers"**
- 11:40 – 12:00 *E. ARSLAN, A. MORGUL* P217  
*Bogazici University, Istanbul, Turkey*  
**"Wideband Self-Biased CMOS CCII"**
- 12:00 – 12:20 *T. KOIVISTO, J. MAUNU, E. TIILIHARJU* P221  
*University of Turku, Turku, Finland*  
**"An Analog Baseband Chain for DS-UWB Radio Receiver"**

**Session Name:** WIRELESS  
**Session Time / Location:** WEDNESDAY, JUNE 25 / VYKM 3  
**Session Chair:** Kivanc MIHCAK, Bogazici University, Turkey

- 11:00 – 11:20 *E. S. ERDOGAN, S. OZEV, L. M. COLLINS* P225  
*Duke University, Durham, NC, USA*  
**"Online SNR Detection for Dynamic Power Management in Wireless Ad-Hoc Networks"**
- 11:20 – 11:40 *K. M. SILAY, C. DEHOLLAIN Dehollain, M. J. DECLERCQ* P229  
*EPFL, Lausanne, Switzerland*  
**"Improvement of Power Efficiency of Inductive Links for Implantable Devices"**
- 11:40 – 12:00 *O. Z. BATUR, G. DUNDAR, M. KOCA* P233  
*Bogazici University, Istanbul, Turkey*  
**"Measurements of Impulsive Noise in Broad-band Wireless Communication Channels"**
- 12:00 – 12:20 *R.G. YUDANTO, D. BURDESE, M. MULASSANO, L. REYNERI* P237  
*Politecnico di Torino, Torino, Italy*  
**"Architecture of Automatic Monitoring System for Fresh Food Quality using Wireless Sensor Network"**



**Session Name:** ADC  
**Session Time / Location:** WEDNESDAY, JUNE 25 / VYKM 2  
**Session Chair:** Selcuk TALAY, University of Pavia, Pavia, Italy

- 14:00 – 14:20 Z. YE, M. P. KENNEDY P241  
*Univ. of College-Cork, Cork City, Ireland*  
**"Hardware Reduction in Digital MASH Delta-Sigma Modulators via Error Masking"**
- 14:20 – 14:40 F. ERARIO, A. AGNES, E. BONIZZONI, F. MALOBERTI P245  
*University of Pavia, Pavia, Italy*  
**"Design of an Ultra-Low Power Time Interleaved SAR Converter"**
- 14:40 – 15:00 B. KAYAALTI, O. CERID, G. DUNDAR P249  
*Bogazici University, Istanbul, Turkey*  
**"A Design Methodology for Asynchronous Sigma-Delta converters"**

**Session Name:** OTHERS  
**Session Time / Location:** WEDNESDAY, JUNE 25 / VYKM 3  
**Session Chair:** Yasemin KAHYA, Bogazici University, Turkey

- 14:00 – 14:20 A. CONVERTINO, A. GIORGIO, S. GIUSTO, R. MARANI, A. G. PERRI P253  
*Politecnico di Bari, Bari, Italy*  
**"Innovative Devices in Biomedical Electronics"**
- 14:20 – 14:40 F. Y. YAMANER<sup>1</sup>, L. CENKERAMADDI<sup>2</sup>, A. BOZKURT<sup>1</sup> P257  
*<sup>1</sup>Sabanci University, Istanbul, Turkey*  
*<sup>2</sup>Norwegian University of Science and Technology, Trondheim, Norway*  
**"Front-end IC Design for Intravascular Ultrasound"**
- 14:40 – 15:00 B. METIN, O. CICEKOGLU P261  
*Bogazici University, Istanbul, Turkey*  
**"Tunable All-pass Filter with a Single Inverting Voltage Buffer"**