

**Duration: 08:30 - 17:50**

**Room: Stockholm**

**WS-11**

## **Chipless RFID Systems, Technology and Applications**

### **Organisers:**

Ferran Martín, CIMITEC, Universitat Autònoma de Barcelona, Spain

Nemai Karmakar, Monash University, Australia

Smail Tedjini, Université Grenoble-Alpes, France

### **Abstract**

Chipless radio frequency identification (chipless-RFID) is an emerging disruptive wireless technology for identification, tracking and sensing. A chipless RFID tag does not contain an application specific integrated circuit (ASIC), hence the reader does all signal processing to read the tag. Chipless RFID tags are low-cost passive microwave/millimetre wave circuits where the information is stored in printable resonators and delay lines and typically implemented in flexible substrates such as polymers and papers, like optical barcodes. In recent years, chipless RFID sensors that combine functional/smart materials and chipless RFID technology have been developed. This workshop reports the most recent advances in chipless RFID tag design, reader architecture, signal processing, chipless RFID sensors and their various emerging applications. This workshop also includes the review of the state-of-the-art chipless RFID with a particular focus on the future trends, novel and advanced technologies for identification and sensing devices design with 3D-printing and carbon nano-tube (CNT), novel encoding schemes and strategies such as high-impedance surfaces, synchronous tags, and alphabets, and emerging applications such as the Internet of things (IoT), 5G communications, autonomous vehicles, smart wearable systems, security and authentication.

### **Programme**

#### ***08:30 - 09:20 Chipless RFID: EM Barcodes of the New Millennium***

Nemai Karmakar, Monash University, Australia

#### ***09:20 - 10:10 Chipless RFID System: Modelling, Medium Access Control (MAC), Ranging and Signaling***

Mohamed El-Hadidy, Duisburg-Essen University, Germany

#### ***10:10 - 10:50 Break***

#### ***10:50 - 11:40 Inkjet-/3D-Printed Chipless RFID-Enabled Wireless Platforms for IoT and Smart Skin Applications***

Manos T. Tentzeris, Georgia Institute of Technology, USA

#### ***11:40 - 12:30 Chipless RFID Tags and Sensors Realised with High Impedance Surfaces***

Simone Genovesi, Filippo Costa, Michele Borgese, Alessio Dicandia, Agostino Monorchio and Giuliano Manara, Università di Pisa, Italy

#### ***12:30 - 13:50 Break***

#### ***13:50 - 14:40 Printed Chipless RFID Sensors for Smart Wearable IoT Applications***

Lirong Zheng<sup>1,2</sup>, Zhuo Zou<sup>1</sup>, Yiqiang Zhan<sup>1</sup>, Yongfeng Mei<sup>1</sup>, Yi Feng<sup>2</sup>, Qiang Chen<sup>2</sup>, Hannu Tenhunen<sup>2</sup>

<sup>1</sup>Fudan University, China, <sup>2</sup>KTH - Royal Institute of Technology, Sweden

#### ***14:40 - 15:30 Chipless RFID Systems with High Data Capacity for Security and Authentication Applications***

Cristian Herrojo, Javier Mata-Contreras, Ferran Paredes, Ferran Martín, CIMITEC, Universitat Autònoma de Barcelona, Spain

#### ***15:30 - 16:10 Break***

#### ***16:10 - 17:00 Chipless RFID Tags Based on Alphabets***

Smail Tedjini, Université Grenoble-Alpes, France

#### ***17:00 - 17:30 Discussion and Concluding Remarks***