ST8: Body Area NanoNetworks: Electromagnetic, Materials and Communications (BAN2-EMC)

Organizing Chairs:
- Valeria Loscri, INRIA Lille-Nord Europe, France
- Anna Maria Vegni, Roma Tre University, Italy
- Ildiko Peter, Politecnico di Torino, Italy
- Ladislau Matekovits, Politecnico di Torino, Italy

Abstract:
In recent years, nanotechnology has emerged as a novel evolution in technology enabling the design of miniaturized devices (i.e., nanodevices). At this scale, the behaviours and characteristics of nanodevices require a deep understanding and a revision of well-known features of devices at the macroscale level. Due to their nanoscale feature, a fundamental requirement is to enable nanodevices to collaborate collectively to achieve a common objective. As a result, a set of nanodevices, sharing the same medium and collaborating for the same task, through communication and networking at the nanoscale, forms a nanonetwork. Nanonetworks are expected expanding the capabilities of single nanodevices and enable new nanotechnology applications including healthcare, biomedical, environmental, military, as well as industrial fields.

The objective of “Body Area NanoNetworks: Electromagnetic, Materials and Communications” (BAN2-EMC) special track is to foster this new area of research. BAN2-EMC proposes to be a forum where the current directions of development are discussed by various components supporting health monitoring, medical diagnoses and treatment, telemedicine, sensing, and assistance to people with disabilities.

BAN2-EMC is intended to put in evidence the multi-disciplinary aspects such a system is based on with special focus on telecommunications, electromagnetic and biocompatibility issues. The main goal of this special track is to involve researchers and academics from various inter-disciplinary fields. It is expected that such an interaction between scientists coming from electrical and electronic engineering, computer science, biology, chemistry, physics, materials science, bio-engineering, bio-technology, and nanotechnology gives a high added-value to the research outputs in the huge field of body area nano-networks.

Topics of interest:
We invite potential authors to submit original (unpublished and not currently under review) and novel papers to BAN2-EMC special track, dealing with telecommunications, electromagnetics, and material science aspects in body area nanonetworks, including (but not limited to) the following:
1. Nanoscale Communications techniques
   o Terahertz Band Communications:
     • Intra-body channel modelling
     • Intra-body propagation modelling
     • Capacity analysis
     • Network and channel coding
     • Information theory in nano-networks
     • Nanoscale/molecular source and channel coding

2. Protocols and architectures for BAN²-EMC
   o Physical and MAC layers modelling
   o Synchronization issues
   o Error Control techniques
   o Routing schemes and architectures
   o Security, Privacy and Trust issues
   o Mobility issues

3. Nano computing aspects
   o DNA, enzyme and membrane computing
   o Nano/molecular electronics
   o Molecular motors

4. Nanodevice Design
   o Nano-antennas:
     • Nanomaterials
     • In- and on-body nano-antennas
     • Nano-antenna Arrays
   o Nano-components:
     • Nano-transceivers
     • Nano-processors
     • Nano-memories
     • Nano-batteries
     • Energy Harvesting
     • Electromagnetic Nano-particles

5. Materials for BAN²-EMC
   o Metals and ceramics as biomaterials
   o Development and characterisation of materials
   o Nanostructured thin films for nano-devices

6. Applications of BAN²-EMC
   o Nanosensing
   o Controlled drug delivery
TPC Members:

- Tadashi Nakano, Osaka University, Japan
- Jun Suzuki, University of Massachusetts, USA
- Ozgur B. Akan, Koc University, Turkey
- Sasitharan Balasubramaniam, Tampere University of Technology, Finland
- Andrea Ferrari, Cambridge University, UK
- Athanasios V. Vasilakos, Kuwait University, Kuwait
- Avi Bendavid, CSIRO Manufacturing Flagship, Australia
- Yogeshwar Ranga, Macquarie University, Sydney, Australia
- Oana Bretcanu, Newcastle University, UK
- Javad Foroughi, University of Wollongong, Australia
- Khan Muhammad Arif, Charles Strut University, Australia