Session at the Alife XII International Conference, Odense, Denmark, 19-23 August 2010

Biological and chemical information processing and production (Bio-Chem-IT)

Organized by John McCaskill, Martyn Amos, Peter Dittrich, and Steen Rasmussen

Chem-Bio-IT is emerging as a field in which both
(i) novel paradigms, implementations and systems for information processing are proposed based on synthetic chemical and biosystems; and
(ii) novel computational descriptions and simulations of complex chemical and biosystems are employed to further the design of artificial living systems.
As such Chem-Bio-IT embraces the interface between IT and synthetic biology, systems biology, biotechnology and bioengineering including especially evolvable, self-organizing and self-repairing systems. The session will give preference to work that marks novel achievements in the integration of IT with Artificial Life at the microscopic level, either theoretically or experimentally, and may for example include contributions based on the following areas:

- Artificial chemistry;
- Bioengineering and Synthetic Biology including cell, gene, metabolic, protein, and signalling systems and networks;
- Bio-interfacing and hybrid electronic-wet systems;
- Computational biomimetics, modeling, simulation and bootstrapping complex systems;
- DNA and Nanobiotechnology towards intelligent devices and embedded systems;
- Ethical, legal and social issues;
- Evolvable and self-assembling IT systems and wetware;
- Molecular, membrane, morphological, natural and cellular computing;
- Security and Standardization.

BioChemIT I (chair: John McCaskill) - Sunday 22nd August
A. Goni-Moreno and M. Amos: Engineered microbial communication for population-level behaviour
N. Zabet, A. Hone and D. Chu: Design principles of transcriptional logic circuits
R. Watson, C. Buckley, R. Mills and A. Davies: Associative memory in gene regulation networks
M. Joachimczak and B. Wrobel: Processing Signals with Evolving Artificial Gene Regulatory Networks

BioChemIT II (chair: John McCaskill) - Monday 23rd August
B. Gil: "Doctor in a cell": vision and accomplishments
M. Heymann, K. Harrington, J. Pollack and S. Fraden: En route to signal inversion in chemical computing
U. Tangen: The emergence of replication in a digital evolution system using a secondary structure approach
S. Dijk, D. Polani and C. Nehaniv: What do You Want to do Today? Relevant-Information Bookkeeping in Goal-Oriented Behaviour