

TITLE:

Mathematical Modeling and Numerical Simulation of Coupled Multiphysics Systems in Nano- and Biotechnologies

ORGANIZERS:

Prof. Roderick Melnik (Tier I CRC, Wilfrid Laurier University, Waterloo, Canada) and Prof. Riccardo Sacco (Politecnico di Milano, Milano, Italy)

ABSTRACT:

Further progress in nano- and biotechnologies relies at a large extent on the development of novel and reliable mathematical models and efficient and accurate computational tools. This minisymposium aims at bringing together applied mathematicians, computational scientists, physicists, biologists and engineers to discuss multiphysics mathematical models and numerical methodologies for their solution, in the context of existing and new applications of such models in Nano- and Biotechnologies. Although analytical techniques can often provide a good insight into the problem, in most cases the complexity of the models necessarily requires to adopt numerical approaches for their solution. Hence, a major focus of this minisymposium is on the development of efficient computational tools for the numerical analysis of such models, on the development of new models, and on their applications in the rapidly developing areas of Nano- and Biotechnologies. This includes, but is not limited to, new technologies based on low-dimensional semiconductor nanostructures, nanotubes, Bio-and NanoElectronics, interaction of nanoobjects with DNA, tissue engineering, systems biology based technologies, and technologies that may assist clinical studies and disease treatments. Mathematical problems arising in this context have often a multiphysics nature and are characterized by the simultaneous presence of several widely varying spatial and temporal scales. In most cases, the associated mathematical models are described by coupled systems either of differential/difference and/or integral equations which require efficient computational techniques for their solution. This minisymposium will address challenges related to the solution of such problems and will provide a forum to the researchers working in this field, encouraging interdisciplinary collaborations.

We plan to have 2 keynote lectures of 30 minutes duration each. The rest of the talks, presented by speakers from Europe, the USA, and Canada, will fit into the standard 20 minutes slots.