

## *Call for Papers*

### IEEE Selected Topics in Signal Processing *Special Issue on* **Advanced Signal Processing in Microscopy and Cell Imaging**

**Aims and Scope:** Microscopy imaging, including fluorescence microscopy and electron microscopy, has taken a prominent role in life science research and medicine due to its ability to investigate the 3D interior of live cells and organisms. The use of imaging in biology is currently undergoing a revolution with the incorporation of all new kinds of microscopic techniques that allow the visualization of tissues, cells, proteins and macromolecular structures at all levels of resolution, functional states, chemical composition and dynamic analysis.

The last two decades have witnessed the explosion of the digital microscopy imaging. Advances in optics, digital sensing technologies and labeling probes have enabled accurate description of cellular components at scales as fine as a few nanometers. These advances have created specific challenges for researchers in signal processing and modern microscopy imaging requires the development of computational methods able to represent and analyze large-scale data. The proposed special issue aims at identifying the theoretical and algorithmic background in signal processing related to the emerging field of microscopy and cell imaging and to present cutting-edge application-oriented contributions in multi-dimensional, multi-scale and multimodal microscopy.

The proposed special issue will focus on, but is not limited to, the following key items in optical, fluorescence, electron or X-ray microscopy with biological applications: advances in classification techniques, dimensionality reduction, image reconstruction, deconvolution, super-resolution and related inverse problems, single molecule localization, multi-view image reconstruction, object tracking, image registration and motion analysis, multimodal image fusion, object detection and segmentation, object recognition, co-localization. Papers will emphasize fundamentals of signal processing including:

- Compressive sensing, sparse representation, Fourier and wavelet analysis
- Convex and non-convex optimization, variational methods, discrete methods, linear programming, factorizations, combinatorial optimization
- Wavelet analysis and related methods
- Bayesian and statistical signal processing: Monte-Carlo algorithms, Particle filtering,
- Belief Propagation, high-dimensional signal processing, image fusion
- Matching learning, kernel and dictionary learning, sparse regression, manifolds and classification and detection
- Graph theory, graph signal processing
- Contextual information-based image processing: spatial point processes, Markov random fields, high-order variable dependencies, large-scale graphical models

#### **Guest Editors**

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#### **Important dates:**

Manuscript submission due:	March 15, 2015
First review completed:	June 1, 2015
Revised manuscript due:	July 15, 2015
Second review completed:	September 1, 2015
Final manuscript due:	October 1, 2015
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