Analyzing 4D Tomographic X-Ray Spectromicroscopy Data with Mantis

Mirna Lerotic [(1)]

(1) 2nd Look Consulting, 17/F., Tung Hip Comm. Bldg., 248 Des Voeux Road Central, Hong Kong

mirna@2ndlookconsulting.com

Spectromicroscopy data consists of images taken at different energies. Combining such data with tomography enables 3D reconstructions with chemical component speciation. As recent reductions in data acquisition times enabled collections of large amounts of data, the main bottleneck in handling the data is the data analysis.

Mantis [1] is an open source tool which in a user-friendly way guides the analysis from preprocessing and identifying chemical components using PCA combined with cluster analysis to tomographic reconstruction of each component (Fig.1).

Big data analysis has made it necessary to analyze the data on the fly. Mantis includes a batch mode which can be used to automatically analyze the data as it is being acquired.
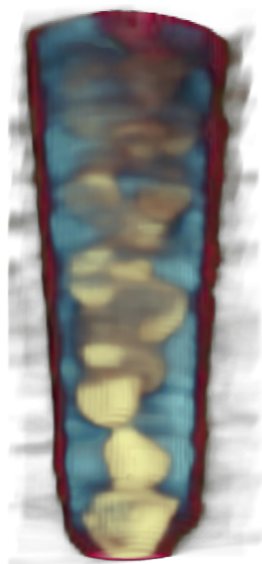

Fig 1. Color coded composite 3D maps showing different chemical components in an acrylate filled polystyrene microspheres inside a carbon nanopippete [2].

[1] M. Lerotic et al. MANTiS: a program for the analysis of X-ray spectromicroscopy data. J. Synchrotron Rad. 21(5); 2014, 1206–1212.
[2] J. Wu et al. Optimization of 3D chemical imaging by soft X-ray spectro-tomography using a compressed sensing algorithm, submitted