Pollen Metrology: Data fusion for Metrology

Control and measurements of nanomaterials

H2020 SOCIETAL CHALLENGES: Health, Secure Energy

PRODUCTIVE SECTOR: Electronics, Materials

PROBLEM DESCRIPTION

By the 2000s, nanomaterial became industrial products, thus nano-processes need to be (nano)mastered. This means working on high density images / huge amount of data in an efficient way, i.e automated reliable, consistent and fast analysis.

CHALLENGES AND GOALS

• Getting workable images
• Image analysing
• Data fusionning to extract the best results

The process has to be fully automated and configurable for the end-user (client).

MATHEMATICAL AND COMPUTATIONAL METHODS

We choose appropriate computational methods from a selection of images types (Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy). As a preliminary step for classification, regions of interest are detected using SVMs techniques (Support Vector Machines) and SIFT descriptors (Scale Invariant Feature Transform). The following step, analysis of AFM images of nanoparticules, has been conducted in partnership with LNE (National Laboratory of Metrology and Testing) and was the object of a PhD thesis with LJK Laboratory. Finally, data fusion is applied by aggregating statistical estimators to obtain the wanted characteristics of the material.
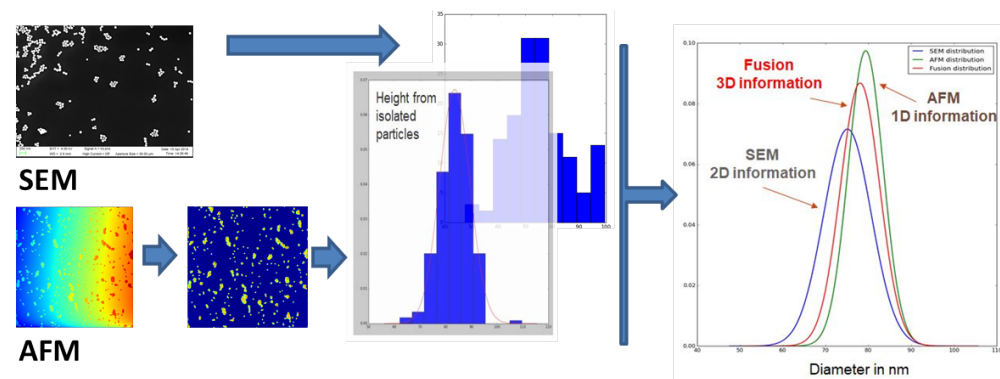
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Results and Benefits

Robust algorithms for preprocessing (removing trends, segmentation and detection) have been adapted and mixed with innovative data fusion methods.

- 99.9 % success on LNE data for automated particle analysis and 100 % of success for automated AFM flattening

- Automated Fusion by combining two estimators coming from multiple measurement techniques

Accurate 3D process control

For end-users:
Higher pro-duction yield
Time reduction from a week to minutes!
Pollen:
Taking over of market share
Recognised as innovative

Laboratoire Jean Kuntzmann, Grenoble

Pollen Metrology, France