*PhD Course in Model and Methods for Materials and Environmental Sciences*

**PhD student:** Daniele Tanzilli, Cycle XXXVII

# Big Data for Industry 4.0 and Materials 4.0

Nowadays, the continuous technological progress allows the companies to install an increasing number of different type of sensors in the industrial plant to improve process monitoring and control. The cons are that these sensors produce a large volume of data at high acquisition rate (BigData) and their handling for the companies (Industry 4.0) who want to benefit from their use is not effortless.

This PhD project is in collaboration with Versalis ENI - Mantova and Fratelli Barilla Srl – Parma companies moreover, a joint supervision with the University of Lille, is planned.


The Project' aim is to investigate the methodology for a better handling of in-line data stream and consequently to increase the capability to control industrial processes. In particular, the focus will be on developing new multivariate approaches based on latent variable methods (MSPC-LVs) for the real time monitoring and control of industrial processes, fusing information from process and "chemical" (such as on-line spectroscopy) sensors.

The PhD project will develop on the following main directions:

- Developing efficient data fusion tools for on-line and real-time applications to be tested at the supporting companies.
- Developing/integrating efficient algorithms for model updating and on-the-fly handling of continuous high-dimensional process data streams.

• Developing novel tools for the selection of the minimal necessary information to retain from process data streaming in real time.

The project aims at achieving a better understanding of BigData opportunities in industrial manufacturing, and in perspective improved tools to monitor and control the industrial process, which could lead to better management of raw materials, reduction of waste, reduction of control analysis and the resolution of any problems in less time.