

OVERVIEW OF THE TECHNOLOGIES TESTED IN THE SAPHIR PROJECT FOR THE ON-LINE MONITORING OF NANOPARTICLE SYNTHESIS.

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Nanotechnologies could play a key role in promoting innovation in design and realisation of multifunctional products for the future, either by improving usual products or by creating new functions and new products. Nevertheless, this huge evolution of the industry of materials can only happen if the main technological and economic challenges are solved with reference to societal acceptance.

The SAPHIR project (funded by the European Commission) aims at:

- Implementing direct production of nanoparticles through the development of a global integrated concept with a responsible approach thanks to safe and on-line characterization.
- Manufacturing by emerging combinations which will allow the elaboration of new generation of metallic matrix composites (MMC), ductile ceramics and ceramic matrix composites (CMC), polymer matrix composites (PMC) for bulk applications in the field of aerospace or energy and for surface engineering in the field of building applications.

We will present significant progress made in the field of the monitoring of processes, in particular coupling Laser Induced Breakdown Spectroscopy (LIBS) technology with the unit of nanopowder synthesis at CEA Saclay.

The On-line particle size monitoring in real time has been investigated with various techniques by all the participants of the consortium. Some very encouraging first results have been obtained on Radio Frequency Plasma Monitoring (RFPM) technology for size monitoring.

Workplace monitoring was also investigated using the LIBS technology which allows continuous monitoring of targeted engineered nano and ultra-fine particles suspended in the air in order to prevent inherent risks due to particle inhalation.

The SAPHIR project proposes an innovative approach based on the sequential integration of technological blocs, from the safe production and recovery of nanoparticles to their conditioning and finally their processing with automated sampling and characterization processes. It promotes a real change in the monitoring strategy of complex processes by reducing the operator exposure to engineered nanoparticles.

Figure: Monitoring Strategy in the SAPHIR project

