

SABYDOMA – Real-life transfer of SSbD platform to industry: coupling ONLINE screening and characterization to a continuous-flow AgNPs production line

Martí BUSQUETS FITÉ – Applied Nanoparticles S.L. –

SABYDOMA is a NMBP-15 Project that addresses the Safety by Design (SbD) challenge as a Control System Problem. The solution that SABYDOMA provides is fundamentally technological and focused in developing high throughput online platforms where nanomaterials (NM) are manufactured and screened at the point of production. SABYDOMA employs system control and optimization theory, including Model Predictive Control (MPC), to integrate SbD principles from theory and laboratory innovation to the industrial production line and decision-making processes. In this innovative approach, the screening signal controls the NM production line in a feedback loop, yielding to “Safe(r)-by-design” NM through Process Robustness and Process Control.

An overview of the Project will be presented before focusing in one of the 4 Industrial Cases: the production of silver nanoparticles (AgNPs) at Applied Nanoparticles SL. This Industrial Case serves as the project's spearhead, known as the 'Lead Demonstrator,' for technology development and implementation. It features a continuous-flow AgNPs production line coupled with various online screening modules. These modules include the characterization of physicochemical properties (Optical properties via a UV-vis in-line flow-cell) and potential toxicity assessment (using a biomembrane module that simulates membrane disruption). The development status of these technologies and its successful transfer to Applied Nanoparticles Industrial Site will be presented.