

ANALYTICAL OFFER NANOMATERIALS

Detection, characterization, and classification of nanoparticles and nanomaterials in cosmetic matrices

Nanoparticles, nano-objects, nanomaterials, and nanostructured materials fall under the field of nanotechnology, a scientific discipline dedicated to the study of matter at the nanometric scale, where one nanometer (nm) equals 10^{-9} meters, or 0.000 000 001 m.

Today, these materials play a key role across various industrial sectors, including cosmetics, pharmaceuticals, food, electronics, energy, and the environment.

At the nanoscale, materials exhibit unique physicochemical properties resulting from quantum phenomena and increased surface interactions.

Definitions of nanomaterials vary by regulation. For cosmetic products, the applicable definition is from the European Cosmetics Regulation No. 1223/2009. In France, nanomaterials as defined by French Decree No. 2012/232 must be declared on the R-Nano platform. Additionally, the European Commission has issued Recommendation 2022/C 229/01 to propose a harmonized definition of nanomaterials.



Context and challenges: cosmetic matrices

Due to their specific properties, nanoparticles are deliberately incorporated into cosmetic formulations (sunscreens, skincare products, makeup). However, their use must be strictly controlled to comply with current regulatory requirements.

Our analytical services enable the **detection, qualification, characterization, and classification** of nanoparticles in cosmetic formulations to ensure compliance, safety, and support innovation.

Analytical procedures: characterization and classification

Detection, qualification, and characterization:

- Field Emission Scanning Electron Microscopy (FEG-SEM): Equipped with a cold field emission electron source, this technique allows for extremely detailed, high-resolution analyses.
- Cryo-Scanning Electron Microscopy (Cryo-SEM): A cutting-edge approach for nanomaterial analysis, offering the unique ability to observe these structures at exceptional resolution while preserving their native morphology under cryogenic conditions. This method overcomes the limitations of conventional sample preparation (such as dehydration, deformation, and structural loss) by using an ultrafast vitrification process.

- Specific Surface Area Analysis using BET Method (Brunauer-Emmett-Teller): Enables precise assessment of surface area and porosity to determine the textural properties that influence nanoparticle reactivity and interaction in cosmetic formulation

Classification and regulatory compliance

- VSSA (Volume Specific Surface Area) Determination: Combines BET surface area measurements with density analysis via pycnometry to identify nanomaterials according to European Commission guidelines and recommendations.
- Particle Size Distribution by Number using FEG-SEM Image Analysis: Conducted in compliance with ISO 19749:2021 standard, this method allows for accurate measurement of particle size, statistical distribution, and classification.

Benefits of our analytical offer



Comprehensive, tailored approach for cosmetic matrices and raw materials



Collaborative development of customized methods



Advanced analytical technologies



Full compliance with applicable standards and regulations



R&D and innovative solutions



Regulatory support for market authorization

Applications



Sun Protection:

Titanium Dioxide (TiO_2) and Zinc Oxide (ZnO) nanoparticles for effective UV protection



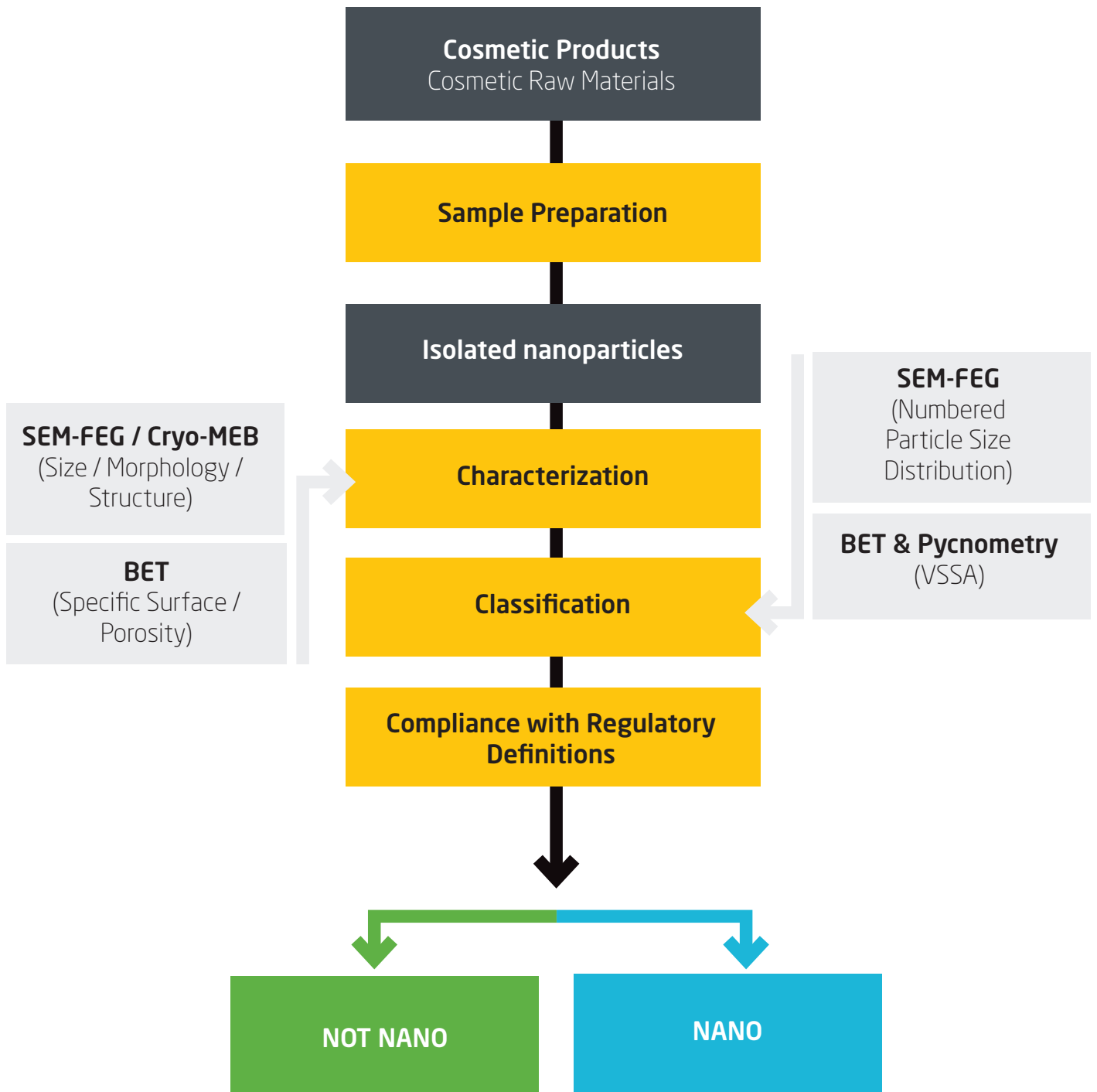
Makeup and Tinted Skincare:

Pigments coated with nanoparticles for optimized color dispersion and improved performance in foundations, lipsticks, and powders; Mica and Iron Oxide nanoparticles for pearlescent and illuminating effects



Skincare and Anti-Aging:

Nanocapsules and liposomes enabling controlled and targeted delivery of active ingredients (vitamins, antioxidants, peptides); Gold and Silver nanoparticles for their anti-inflammatory and antioxidant properties



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