

High Performance Nano-sized Materials. The Power of Nano

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Abstract

Nanomaterials have been attracting much attention over the last the decade in the field of numerous functional materials. Their unique and unprecedented properties will definitely play a key role in the next generation of catalysts, ultraviolet absorbers, semiconductors, transparent conductors, cosmetics, coatings, solar cells, etc.

Only very few technologies offer the possibility to produce colloidal dispersions of nanoparticles having narrow size distributions and high available surface areas. This is accomplished by stabilizing the particles at their primary size with no formation of secondary or tertiary structures. To date most available technologies are dry powder techniques which generate large aggregates, being those difficult to formulate in solution. The resulting dispersions have much less effective surface area, thus defeating the purpose of nanotechnology itself.

At Industrial Química del Nalón S.A., an innovative, versatile and environmentally friendly technique is being developed to produce high performance nanoparticles in the form of nanosized metals, metal oxides or mixed metal oxides. This bottom-up technology enables the continuous production of fully crystalline nanoparticles in dispersion with narrow size distributions and precise stoichiometries in a predictable manner and without post treatments.

Initial developments made possible the production of two kinds of pure nano-TiO₂ (anatase) colloidal dispersions at different pH values and particle sizes for photocatalytic applications. Presently, efforts are focused on the following two developments:

- Synthesis of CeO₂, ZnO (nanoparticles or nanorods), silver and mixed ferrites.
- Reduction of current DLS particle size (35 – 40 nm) down to a mono-dispersion state in any sort of carrier fluid.

These nanoparticles have great potential as EMI shielding materials, hybrid polymers, printed electronics, surface coatings, transparent conductors, biotech materials, UV-absorbers, catalysts, etc