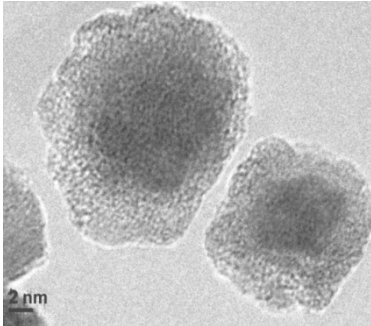


APPLICATIONS OF TECNAN NANOPRODUCTS IN SECURITY AND DEFENSE

TECNAN S.L. was created in December 2007 with the aim of producing and commercializing at industrial scale nanoparticles for multisectoral applications as well as other products based on them.

Currently, TECNAN counts with three lines of products:

- 1- POWDER NANOPARTICLES: TECNAN produces a wide range of ceramic nanopowders including simple and complex oxides, phosphates and carbonates. Among the complex



species which are available it is worth highlighting the mixed oxides which can be specifically synthesised according to the requirements of the client due to the outstanding versatility of the technology employed, being the only company in the world that has the capacity of producing at industrial scale these kind of nanoparticles. The resulting nanoproducts have a high purity, low aggregation, narrow size distribution, very small size and a great specific surface area, what improves its activity and

efficiency and makes those nanomaterials optimum for a big number of customised applications.

- 2- NANODISPERSIONS: the nanoparticles produced by TECNAN can be supplied dispersed in a liquid media facilitating the introduction of these materials into the production processes and products of the clients.

- 3- READY TO USE PRODUCTS: nanoparticles-based compositions ready to be directly applied on different substrates obtaining effects like hydrophobicity or oleophobicity.



TECNAN counts with an industrial capacity (tons per year) along the whole process having large-scale production equipment based on advanced technologies.

The nanoproducts produced by TECNAN have different applications within the field of the Security and Defense. Using TECNAN nanomaterials it is possible to improve different factors among this field:

- **Transparency:**

- TCOs: For specific pieces and coatings mainly in electronic devices.
- Transparent ceramics: To substitute glass elements in Night Vision devices or electromagnetic windows - Improvement of abrasion resistance, strength and thermal stability. Also they can be used As optical materials for specific lasers
- New shields: To obtain transparency and provide maximum resistance without high weights.

- **Magnetism:**
 - Improved magnets: They make possible the miniaturisation and weight reduction of devices such as engines as well as the use of new weapons like the railgun.
 - Magnetorheological fluids: For fast reinforcement of military cloth pieces or sudden transformation of temporary rigid structures. These fluids also improve the response in dampers which are subjected to extreme battle conditions.
- **Merging into landscape (energy demand)/ Invisibility:**
 - New energy storage devices like flux batteries by the use of new nanomaterials for highly active electrodes.
 - Li-ion batteries could be also improved with highly active nanomaterials
 - New complex nanomaterials are being developed to be deposited over solar panels so as to increase the quantity of visible light available for its transformation into electricity, taking advantage of additional radiations like IR and UV.
- **Visibility distortion:**
 - Coating of nanocrystals: To distort normal light behavior over objects providing new possibilities of refraction and reflection, both mirror and diffuse, as well as anti-reflective to avoid revealing the position of moving units with glass components.
- **Material reinforcement (textiles):**
 - High resistance textiles: Using nanomaterials or nanocomposites it is possible to improve resistance and supply textiles with properties like fire-resistance or hydrophobicity.
- **Missile deviation:**
 - Modification of communication frequency: Using innovative geometric patterns combining conductive and isolating materials.
 - New magnetically tunable filters and resonators for microwaves frequencies.
 - Fake heat elements: An specific coating could be activated over specifically located objects/element so that a sudden exothermic reaction is produced. Heat would be the result of a chain reaction where free radicals are involved.
- **Others:**
 - The ready to use products produced by TECNAN, could be applied for instance in security vehicles to improve the visibility of drivers or could be applied on facades of military buildings providing them with antigrffiti properties.