# Scientific/Technical offer to licensing

## Method for producing nanocorundum

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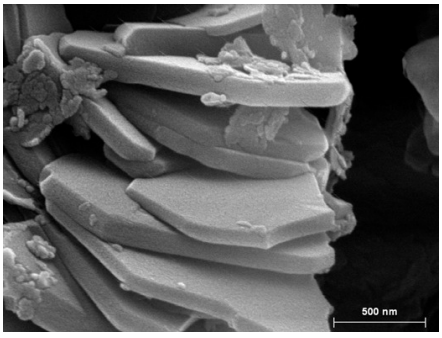
**Background:** There are different polymorphs of aluminium oxide, prominent among them is alpha-aluminum oxide (corundum) because of its high technological interest –high hardness, wear and chemical resistance, thermal stability and high melting point-. The classical procedure for producing corundum for non metallurgical applications is based on a slow crystallization of melted alumina, that is obtained from bauxites by the Bayer method. In general, the production of corundum at ordinary pressure is possible by sol-gel methods based on obtaining polymorphous transition phases of alumina from hydroxides or oxihydroxides and then, the transition phases are transformed to the alpha polymorph (corundum) by an additional heating treatment. Current methods for producing corundum require commodity pre-treatments as melting, dissolution or acid or base treatments to produce transition phases of alumina, and thus additional heating treatments are necessary to obtain the alpha-polymorph. Therefore, a method for producing corundum simpler than current ones would be interesting.

**The invention:** Researchers from Geology Department of University of Valencia have developed a novel method for producing corundum of low crystallinity (nanocorundum) using natural or synthetic commodities in solid state, without pre-treatment. This procedure consist of two steps, a first one of heating treatment at adequate temperature and ordinary pressure and the second one of abrupt cooling (quenching) of the first step product. The method of the invention produces nanocorundum, avoiding the formation of alumina transition polymorphs of low temperature. As a result, the final product is porous and their disintegration is easy, avoiding the hardness and difficult grinding of the compact corundum.

**Applications:** The main application of the technology is in the **chemical industry**, for producing corundum for diverse uses (refractories, abrasives, functional fillers for polymers, production of ceramics, glasses and glazed ceramics with reactive alumina, etc) and nanocorundum for special applications (catalyst carriers, implants, aerospace applications, etc.).

**Advantages:** The most remarkable advantages provided by this technology are:

- The use of natural or synthetic commodities in solid state.
- Simplicity of the procedure, allowing small-scale or in industrial-scale production of corundum.
- The obtained corundum can be easily disintegrated, since it is a porous product.




SEM image (at high magnification) of the greater crystals of the obtained nanostructured corundum

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**Knowledge area**
Industrial Chemistry

**Collaboration**

Technology available to licensing

Other collaborations may be considered:

Cooperative projects to develop applications

Development of pilot plant experimental study

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