



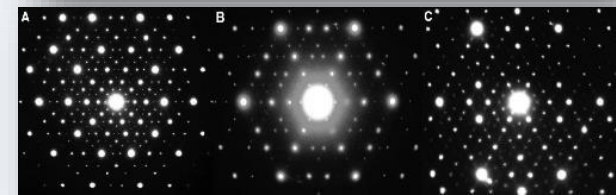
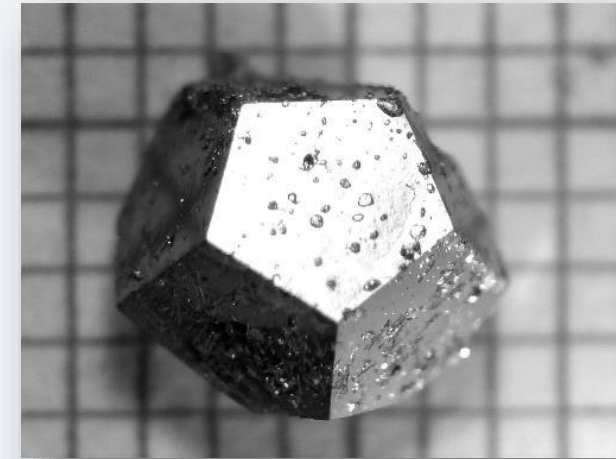
**Quasicrystalline
powder
AlCuFe**

Project features

Quasicrystals is a new class of materials that represent an intermediate state between amorphous solids and ordinary crystalline materials.

The structural features of this class of materials, such as the fifth order symmetry and the mosaic method of formation, give them unique physical properties.

The unique properties of quasicrystals open up a wide range of areas for their effective application in various scientific, technical and technological fields.



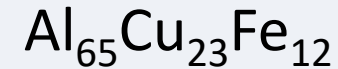
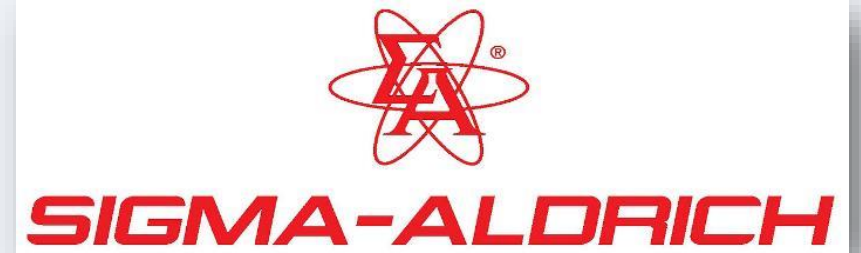
SEM HV: 20.0 kV SEM MAG: 108 x 500 µm VEGA3 TESCA
Det: SE

Competitive landscape

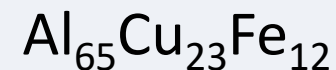
In the world, there are various technologies for the synthesis of Quasicrystals, but all of them are quite complex, time-consuming, expensive and have low productivity, which as a result creates a high price for this material.

Currently, there are only two offers on the American market for the sale of small gram volumes of Aluminum-Copper-Iron quasicrystal with a price of more than twenty thousand dollars per one kilogram.

The small amount of material available and the high cost of quasicrystals on the world market were the main barriers to their large-scale industrial implementation.



200\$ / 10g



250\$ / 10g

Technology

Our team has developed a unique technology for industrial synthesis of quasicrystal Al-Cu-Fe.

The high productivity of the technology and the increase in production volumes made it possible to reduce the production cost of the Quasicrystalline powder by tens of times and to form an acceptable market price.

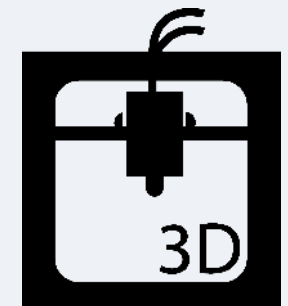
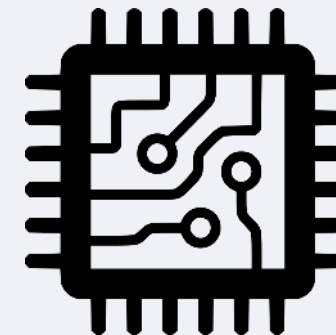
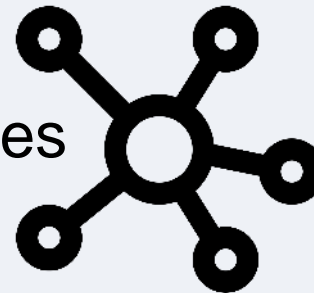
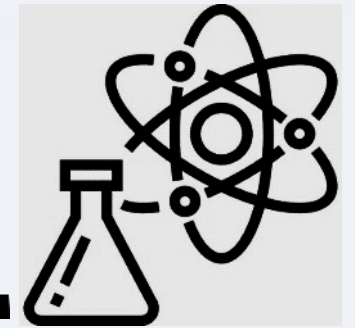
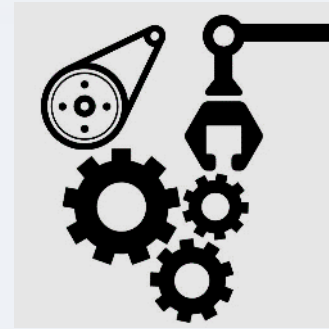
The current technology allows us to produce these materials in volumes of about 10 tons per year.

With an increase in demand and the number of customers, we can multiply our production capacity in the shortest possible time to meet the growing needs of the global market.



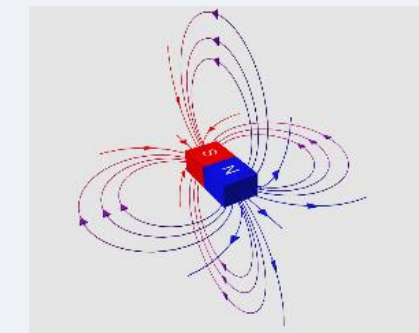
Target audience

- Engineering enterprises
- Energy companies
- Oil and gas production companies
- Chemical manufacturing
- Metallurgical and mining companies
- Manufacturers of industrial oils and greases
- Automotive industrial companies
- Electronics industry
- Composite material manufacturers
- 3d printing manufacturers
- Research organizations



Application areas

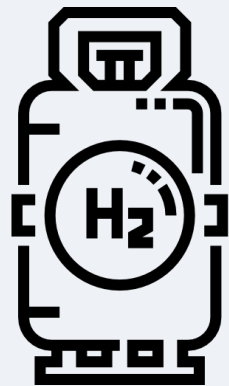
1. Friction systems - low coefficient of friction, high hardness, non-stick and anti-gripping characteristics allow to reduce the friction of parts of mechanisms when used in oils and lubricants, reduce noise and vibration, increase the service life of the mechanism by three times and reduce its energy consumption by 10-12%.
2. Quasicrystalline powder as a filler for polymer composite materials to improve wear resistance, physical and mechanical characteristics.
3. Quasicrystals is also actively used in surgical instruments, electronics, lithium-ion batteries, as fillers of composite materials, magnets, polymers for 3D printing.



Promising areas

Quasicrystalline materials have unique properties that open up the prospect of their use in the following areas:

- The creation of new hydrogen catalysts for steam reforming of methanol;
- Creation of new intermetallic hydrogen storage systems;
- Solar panel coatings to increase efficiency by 30%;
- Creation of a new type of anodes for Li-ion batteries;
- Components of electronics, magnets, optics, thermal converters



The results obtained for friction systems

The use of Quasicrystals as a modifier of rubbing systems made it possible to obtain the following results:

- When quasi-crystalline powder is introduced into the oil system of the reducer 1ts2u-160 on the territory of the Kostroma State District Power Plant reduction in energy consumption was 12%;
- With the introduction of quasi-crystalline powder into the oil system of the DoALL C-670 M band saw gearbox, the energy consumption decreased by 10%; also, due to the temperature drop, the oil stopped burning out and the need for periodic oil topping was eliminated;
- When tested on a special stand, it was shown that the service life of bearings with quasicrystals increased by 2.5 times in comparison with original bearings;
- When a manual transmission and a transfer case of a car are introduced into the oil system, hum, noise and vibration are reduced, and the service life of these nodes also increases.

The results obtained in the field of polymers

The use of Quasicrystals as a filler for polymers made it possible to obtain the following results:

- With the introduction of quasicrystalline Al-Cu-Fe powder as a filler into the polytetrafluoroethylene polymer matrix, ultra-low wear of the samples of this composite was found. The highest wear resistance, 2200-3100 times higher than that of unfilled polytetrafluoroethylene, was recorded in composites with a filler concentration of 16 vol.%. At the same time, the addition of only 1 vol.% of a quasicrystalline filler reduces PTFE wear by 70 times;
- Quasicrystalline Al-Cu-Fe powders have been used as a novel filler in poly (p-phenylene sulfide) (PPS). The quasi-crystalline Al-Cu-Fe filler significantly improved the wear resistance of the volume loss polymer-based composites. In addition to improving the wear resistance of the composite, the quasicrystalline Al-Cu-Fe filler showed low abrasion relative to the counter body made of chromium steel 52100. In addition, the results of mechanical tests showed a twofold increase in the elastic modulus of the reinforced composites compared to the unfilled polymer samples.

Interaction options

- Organization of pilot tests of a quasi-crystalline modifier at partner enterprises to assess the economic effect and subsequent scaling of the application.
- Sale of products - fulfillment of commercial orders for the production and sale of the modifier in any industrial volumes. Creation of a network of dealers and partners for the sale of products in all countries and regions of the world.
- Attraction of a strategic investor to the project by buying out a stake in the project company and subsequent investment co-financing of the project development for the development of the world market for the consumption of quasi-crystalline material.
- Creation of an industrial alliance with large industry companies to localize the production of unique products and products using quasicrystals. The implementation of this interaction format will create a cloud of products that have no global analogues and take a leading place in the list of global industrial companies.



Thanks a lot for your attention!

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<https://nanocom.ru>

<https://quasicrystal.eu>