ALUMINA CERAMICS

Alumina (aluminum oxide) is the most important, widely used and cost effective oxide ceramic material.
The technical alumina ceramics contain at least 80% of aluminum oxide (**AL_2O_3**).
Small amounts of silica (**SiO_2**), magnesia (**MgO**) and zirconia (**ZrO_2**) may be added to alumina ceramics.
Addition of zirconia to alumina ceramic results in considerable increase of the material fracture toughness.

Alumina possesses strong ionic bonding, which determines the material properties:

- ⊡ High mechanical strength (flexural strength) and hardness;
- ⊡ High wear resistance;
- ⊡ High resistance to chemical attacks of strong acids and alkali even at high temperatures;
- ⊡ High stiffness;
- ⊡ Excellent insulating properties;
- ⊡ Low coefficient of thermal expansion;
- ⊡ Good fracture toughness;
- ⊡ Good thermal conductivity;
- ⊡ Good biocompatibility.

Aluminum ceramics parts are manufactured by the following technologies: uniaxial (die) pressing, isostatic pressing, injection

molding, extrusion and slip casting. The parts may be machined in "green" condition before sintering (firing).
Aluminum ceramics are widely used in electronics and electrical engineering, metallurgical processes, chemical technologies, medical technologies, mechanical engineering, military equipment.

Aluminum ceramics are used for manufacturing insulators, capacitors, resistors, furnace tubes, sealing refractory parts, foundry shapes, wear pads, thermocouple protection tubes, cutting tools and polishing/grinding powders, ballistic armor, laboratory equipment, bio-ceramic parts for orthopedic and dental surgery, bearings.

Properties of some alumina ceramics

- Alumina ceramic (94% alumina)
- Alumina ceramic (97.5% alumina)
- Alumina ceramic (99.8% alumina)
- Alumina aerogel monolith

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