



Technologies to Products...On the Leading Edge

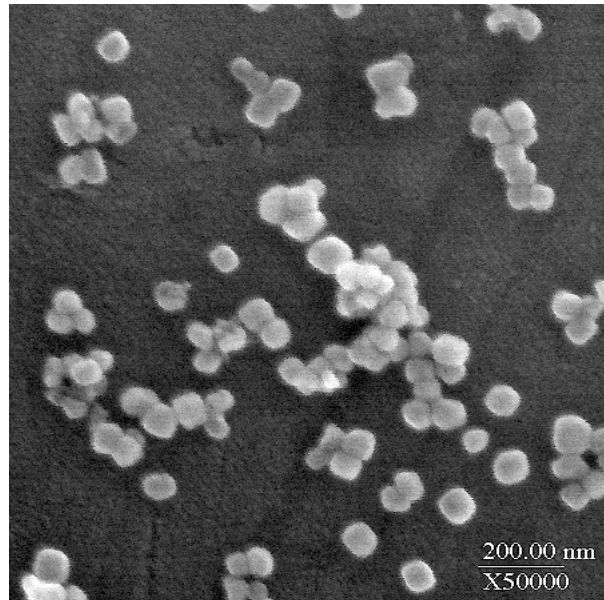
NanOxide™ HBS-2000

Barium-Strontium Titanate

HBS-2000 is a formulated high purity barium-strontium titanate nano-sized powder designed to meet demanding electronics applications. Our HBS-2000 is made up of a Barium Strontium ratio of 67:33. It is readily dispersible in aqueous and non-aqueous solvents with appropriate surfactants which are available from TPL, Inc. if necessary.

Typical Properties

Specific Surface Area	3.6-10.9 m ² /g
Nominal Size	200 nm (BET)
Loss on Ignition	<1.5%
PH (ASTM - D1208)	9.0-11.0
Chemical Analysis	
Ba + Sr:Ti (XRF)	0.995-1.010
SrO (ICP)	<0.1%
CaO (ICP)	<10 ppm
MgO (ICP)	<10 ppm
SiO ₂ (ICP)	<200 ppm
Al ₂ O ₃ (ICP)	<100 ppm
Fe ₂ O ₃ (ICP)	<10 ppm
(Ba + Sr)TiO ₃	> 99.5%



Applications

HBS-2000 has been successfully used in multilayer ceramic capacitors (MLCC), monolithic ceramic capacitors, and polymer composites. Barium-Strontium titanate thin films and composites are finding application into a wide range of broadband RF and microwave devices such as tunable filters, phase shift devices, electromagnetic absorbers and antennas.

Processing

When introducing HBS-2000 into your process, please keep the following points in mind:

- The manufacturing process for barium strontium titanate includes a drying step which can induce soft agglomeration (roughly 75 micron size particles). These agglomerates are easily broken up by ultrasonication or ball milling.
- Some harder agglomerates can also exist in the powder comprising several to tens of particles. Because of the extremely fine particle size, these agglomerates require more energy than is traditionally required for larger, micron sized particles. When switching from micron sized powder to nano-sized powder it may be necessary to lengthen ball milling time by a factor of two or three.
- Because of the extremely high surface area, higher surfactant concentrations are typically necessary to disperse nano-sized barium titanate relative to micron sized powder.

TPL, Inc. has considerable experience with slurry production, tape cast compositions, composite formulations, dry pressing and firing operations and can assist in determining a process for your application.

For more information, contact:
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Important Notice

Typical properties should not be construed as a specification. Before using this product you must evaluate it and determine its suitability for your intended application.

Warranty; Limited Remedy; Limited Liability

This product will be free from defects in the materials and manufacture as of the date of purchase. **TPL MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE.** If this product is defective, your exclusive remedy shall be, at TPL's option, to replace or repair or refund the purchase price of the TPL product. Except where prohibited by law, TPL will not be liable for any incidental loss or damage arising from the use of this product.