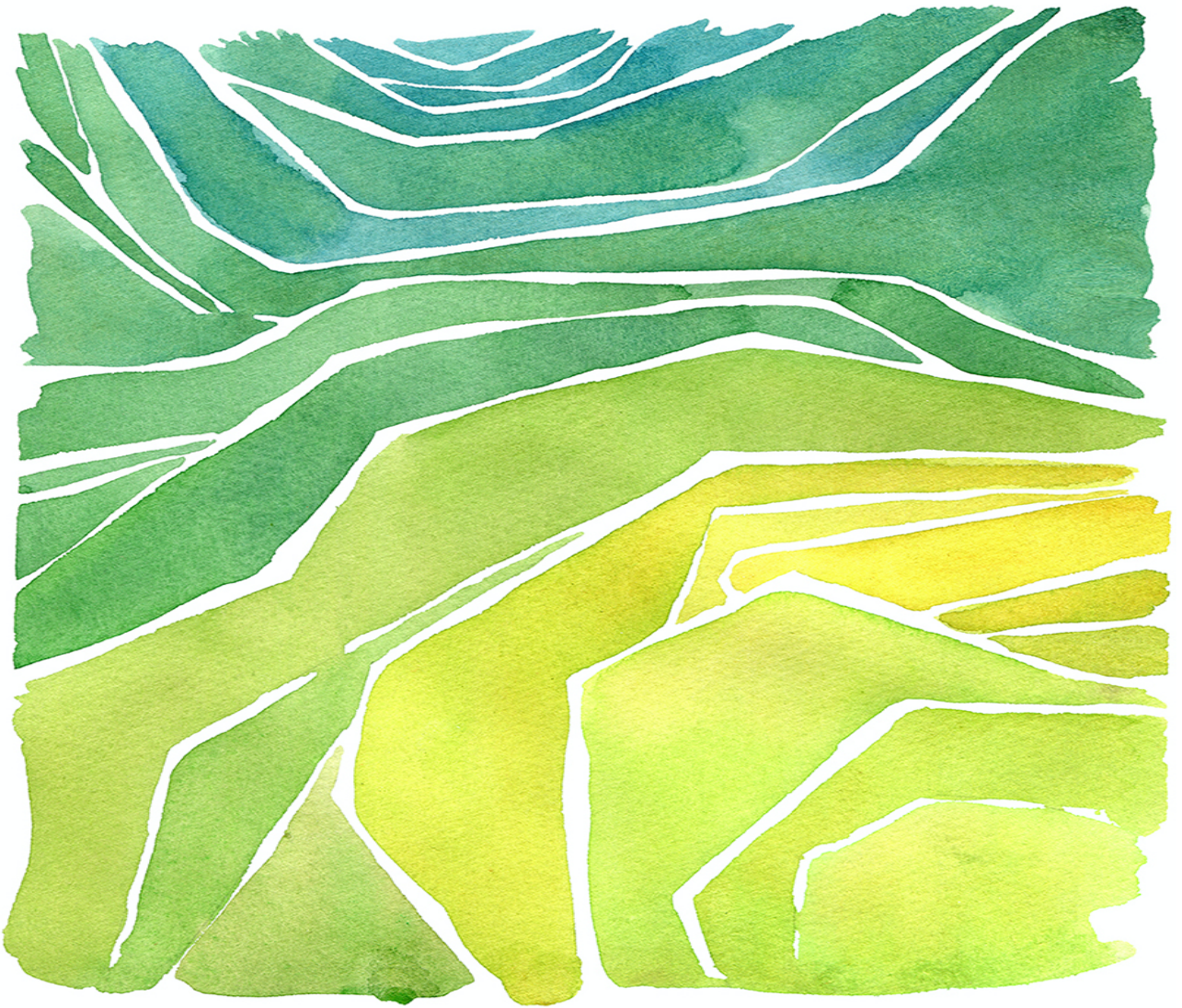


**BSB**

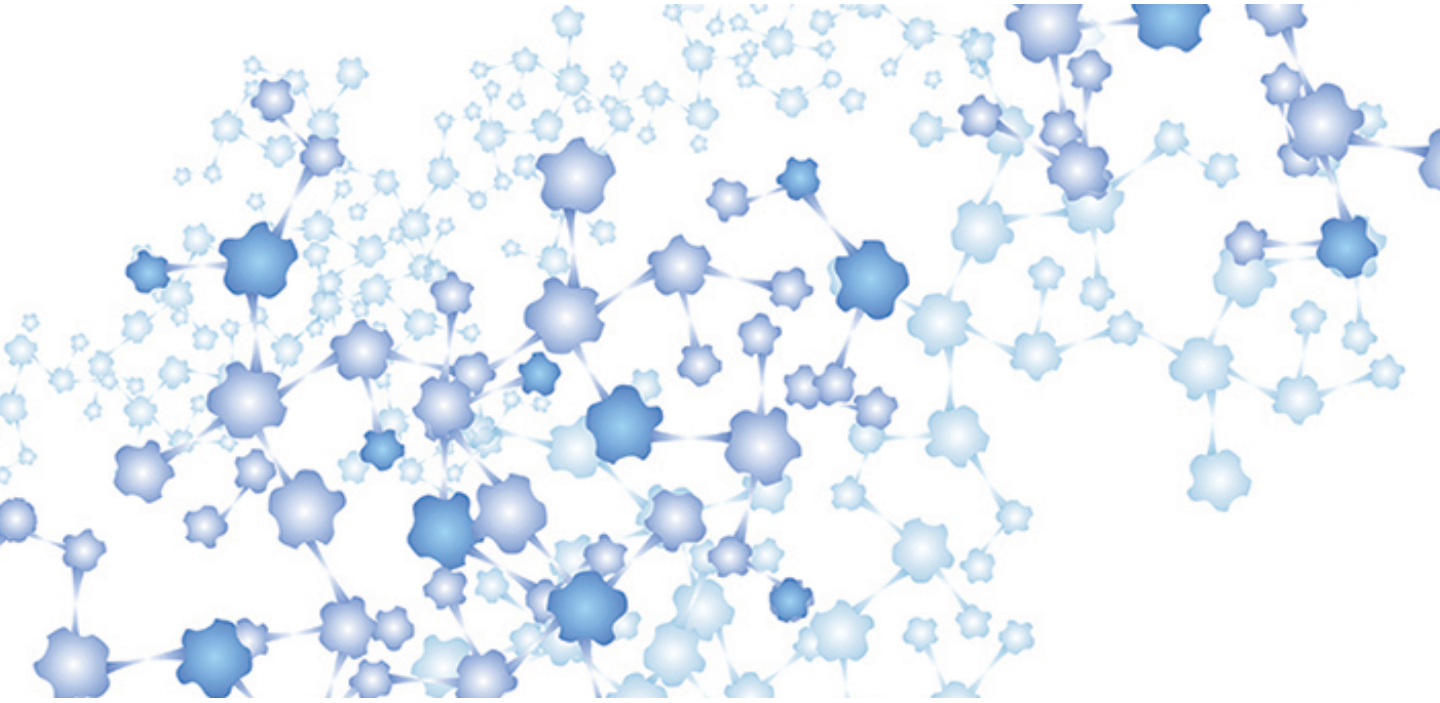


**Biosil<sup>®</sup>**

Bio Nanoporous Silica  
from Rice Husk  
for Paints & Coatings

Better products. Better prices. Better life.





## Bio Nanoporous Silica



**Nanosilica** or Silicon Dioxide nanoparticles ( $\text{SiO}_2$ ) is a marriage between nanotechnology and one of the most widely used and manufactured materials, silica.

**Silica** in its nano size has a range of advantages: large specific surface area and energy, strong surface absorption, high chemical purity and good dispersion. Due to its unique properties, nanosilica has established roles in the fields of physics, chemistry and biology.

**Thus** nanosilica is applicable to a large and diverse range of industries, from construction to rubber and plastic additives, paints and coatings, medicine and cosmetics, and more. Nanosilica is a ubiquitous constituent in materials which are a part of our daily life.

**BSB** is the world first producer of Bio-based Nanoporous Silica from rice husk on an industrial scale with the Biosil Brand.







## The Sand Crisis & Solution

50 billion  
Tons/Year

**Growing** demands for nanosilica, in the face of diminishing virgin resources and the increase of excess waste, call for more sustainable production practices.

**Sand** is the third most used resource after air and water, and is a prime constituent in silica production.

**50 billion tons** of sand is mined per annum leading to devastating ecological and sociological consequences.

**The Solution** for the above mentioned challenges was found by BSB's scientists with the use of rice husk ash instead of sand or quartz.





## From Ash to Cash



**Rice** is the second most consumed food, globally. Rice husk, which is the by-product of rice production, can be used as fuel in energy production. However, the result is rice husk ash, which is a waste.

**The use** of rice husk in the production of Bio-based nanoporous silica is a revolutionary technique in which waste is utilized to create a nanomaterial of high purity and value.

**Rice husk** ash is rich in amorphous silica, making it a highly customizable and sustainable source of silica. This conversion from ASH to CASH is an initiative in building a circular economy.

\*Annual Renewable Rice Husk Source in Vietnam







# The Bio-Silica Production Pioneer

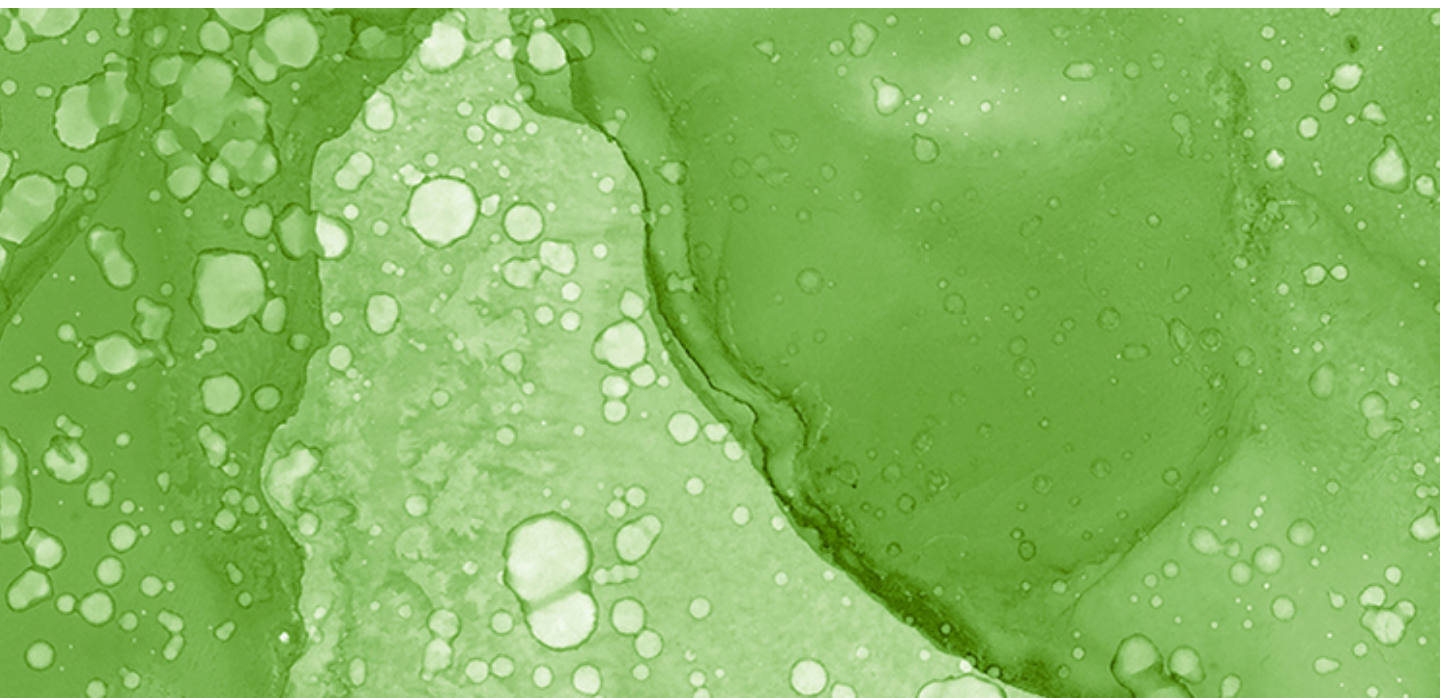
**Asian countries** are predominantly rice producers with Vietnam being one of the top five in the world. The extraction of silica from this renewable resource has been endeavored by many scientists and researchers.

**Leading** this scientific race, BSB Development & Investment Co., Ltd. is the first company to successfully produce rice husk based nanoporous silica on a commercial scale in the world.

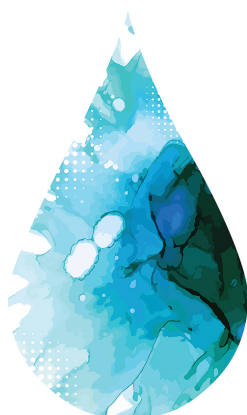
**Strategically** located along the waterways of the Mekong Delta in Vietnam, BSB has brought together the abundant access to rice husk, state-of-the-art technologies and skilled professionals to develop a cost effective nanoporous silica in its purest form.

**After four years** of extensive research, Biosil was formulated to perfection, harnessing the highest amorphous silica content from rice husk and customised for various applications.





# Paints & Coatings Applications



**Nanocoatings** provide cost-effective solutions to industries with demanding applications and performance requirements.

**Coating manufacturers** need to stay abreast with changing global trends such as the demands for multifunctionalities, waterborne, low VOCs and Bio-based coatings.

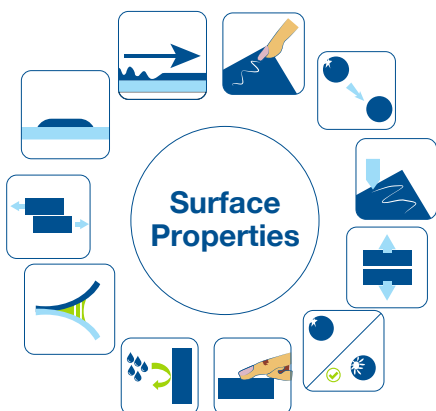
**The use of nanomaterials** results in performance enhancements in wear and corrosion resistant coatings and demonstrates significant enhancement in outdoor durability, and vastly improved hardness and flexibility compared to traditional coatings.







## Nanocoatings vs Traditional Coatings



**Unlike traditional coatings**, nanocoatings can offer multiple functionalities in a single coating such as:

- Anti-microbialism.
- Product longevity.
- Gloss retention.
- Thermal insulation & flame retardancy.
- Dirt and water repellence.
- Hardness.
- Corrosion resistance.
- Ultraviolet radiation stability.
- Anti-graffiti & Self-cleaning.

**Anti-viral** nanocoatings also represent an excellent and viable technology to destroy the viruses' surface structure and functionalized nanoparticles can affect the viruses due to chemical interactions between the molecules-functionalizers and moleculesreceptors at the virus surface.

**Nanosilica** is used to improve scratch and abrasion resistance, corrosion resistance, impact resistance, increase tensile strength, and superhydrophobic and easy-clean properties.





## Sustainability Development



**Environmental sustainability** is also an important factor across most coatings markets and contributing to the commercial development of nanocoatings.

**There is a need** to replace petrochemical products and toxic heavy-metals in coatings with Bio-based coatings to increase sustainability.

**Favoured coatings** include waterborne coatings, highsolids, radcure coatings, powder coatings and nanoparticle coatings that allow for a reduction in carbon footprint and also improve human health and safety.







## Bio-based coatings



**Being a rice-husk based Nanoporous Silica**, Biosil can be used as a Bio-based nanomaterial to meet the increasing demand of the global Green Coating market and can be customised for the manufacturing of a large variety of coatings & nanocoatings, including but not limited to:

- Anti-fingerprint.
- Anti-fouling & Easy-to-clean.
- Self-cleaning.
- Anti-icing & De-icing.
- Anti-reflective.
- Anti-corrosion.
- Thermal barrier & Flame Retardant.
- Abrasion & Wear resistance.
- Anti-microbial.
- Anti-viral.

**Biosil** can also be used as a matting agent, anti-settling and anti-sagging filler for the manufacture of high performance coatings.





**BSB**

ARE YOU  
DRIVING  
**CHANGE**

**OR** ARE YOU  
BEING **DRIVEN**  
BY IT

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