

# FLEX-SN AP

## AP<sup>4</sup> Antipathogenic Silicon Nitride Powder

Silicon nitride ( $\text{Si}_3\text{N}_4$ ) is a gray, white, or gray-white powder that is insoluble in water and relatively chemically inert.  $\text{Si}_3\text{N}_4$  occurs in three crystalline phases –  $\alpha$ - and  $\beta$ -phases are the most common forms prepared at atmospheric pressure while the  $\gamma$ -phase can only be synthesized under high pressure and high temperature. The  $\alpha$ -phase is chemically unstable compared with the  $\beta$ -phase, transforming into the  $\beta$ -phase at high temperatures when a liquid phase is present.

AP<sup>4</sup> is SINTX's antipathogenic  $\text{Si}_3\text{N}_4$  powder that is currently undergoing research as an additive, coating, or composite that can impart antipathogenic properties to other materials when available at the surface. Silicon nitride has demonstrated antibacterial properties, antifungal properties, and antiviral properties<sup>1,2,3,4,5,6</sup>. Sintered  $\text{Si}_3\text{N}_4$  powder particles reduce viral loads by as much as 99%, starting one minute<sup>7,8,9</sup>, after exposure. This result reflects specific chemical reactions on the surface of  $\text{Si}_3\text{N}_4$  that resulted in RNA cleavage, protein disruption, and viral inactivation.

Silicon nitride has been tested against viral strains that were each exposed to an experimental solution containing silicon nitride powders, using standard testing protocols.

- Influenza A (Common Flu, H1N1)<sup>10,11</sup>
- Feline calicivirus<sup>10,11</sup>
- Enterococcus<sup>10,11</sup>
- SARS-CoV-2 (COVID-19)<sup>1,2</sup>

The development of FleX-SN AP applications aims to reduce and prevent the spread of viral diseases.

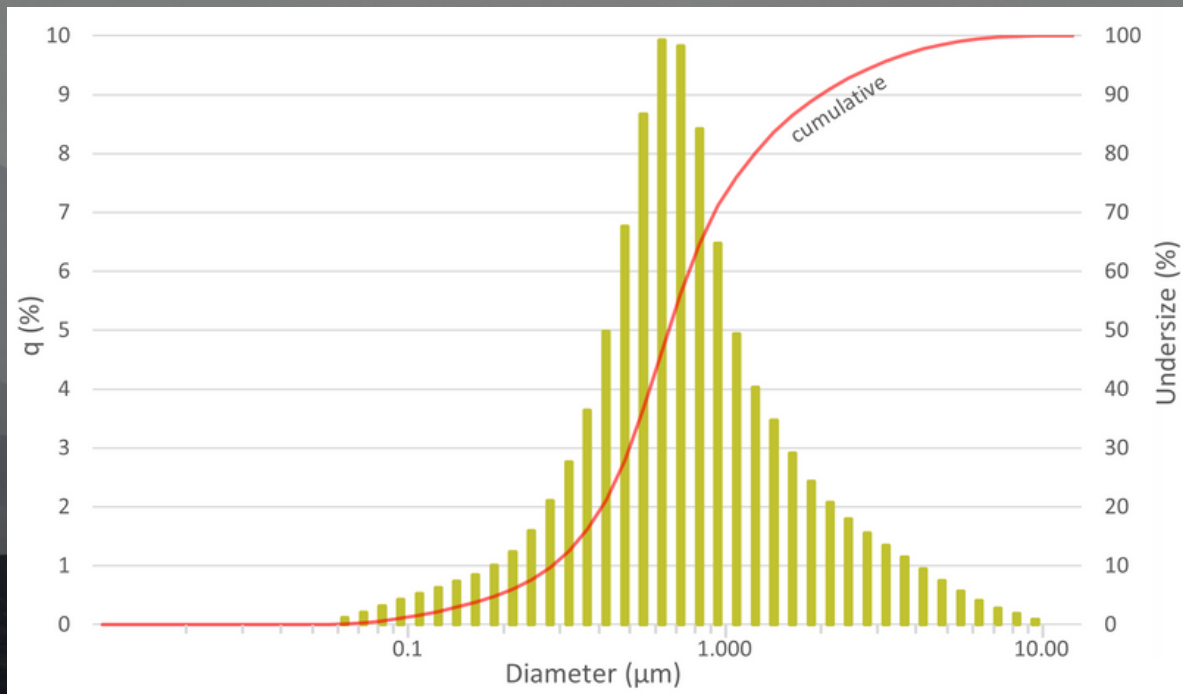
FleX-SN AP can be applied in a variety of ways for a multitude of applications as indicated below:

- **Face masks** – SINTX's FleX-SN AP material can help create a safe and effective consumer face mask with broad-spectrum antibacterial and antiviral activity<sup>1,2</sup>
- **Surgical/isolation gowns, surgical drapes, and curtains** – SINTX's FleX-SN AP could help minimize the chance of healthcare-associated infections and stop the spread of disease<sup>1,2</sup>
- **Surface coatings for high touch areas** – SINTX's work at incorporating FleX-SN AP into polymer materials can help create safe and effective surfaces that resist bacteria and viruses
- **Air filters for automobiles, homes, offices** – With FleX-SN AP, cabin filters for cars and public transit could not just filter dust and allergens, but also filter and inactivate bacteria and viruses
- **Wound care** – FleX-SN AP is inherently resistant to bacterial colonization and biofilm formation, making it antibacterial and an excellent material for consideration in a wound dressing

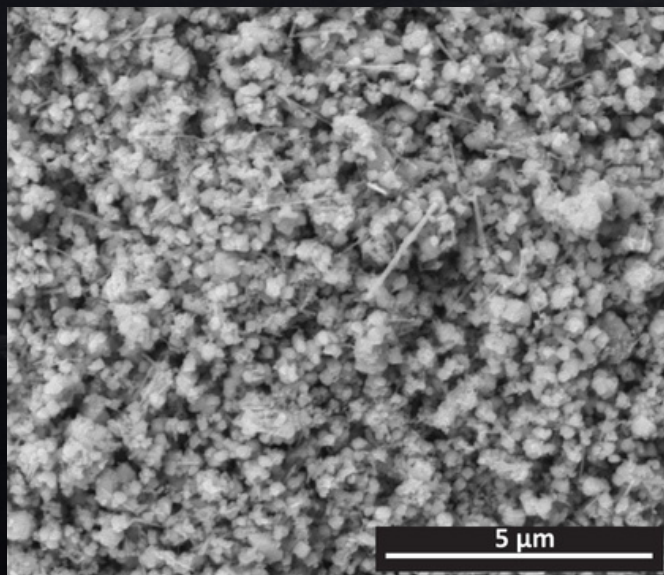
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PARTICLE SIZE DISTRIBUTION OF AP<sup>4</sup>



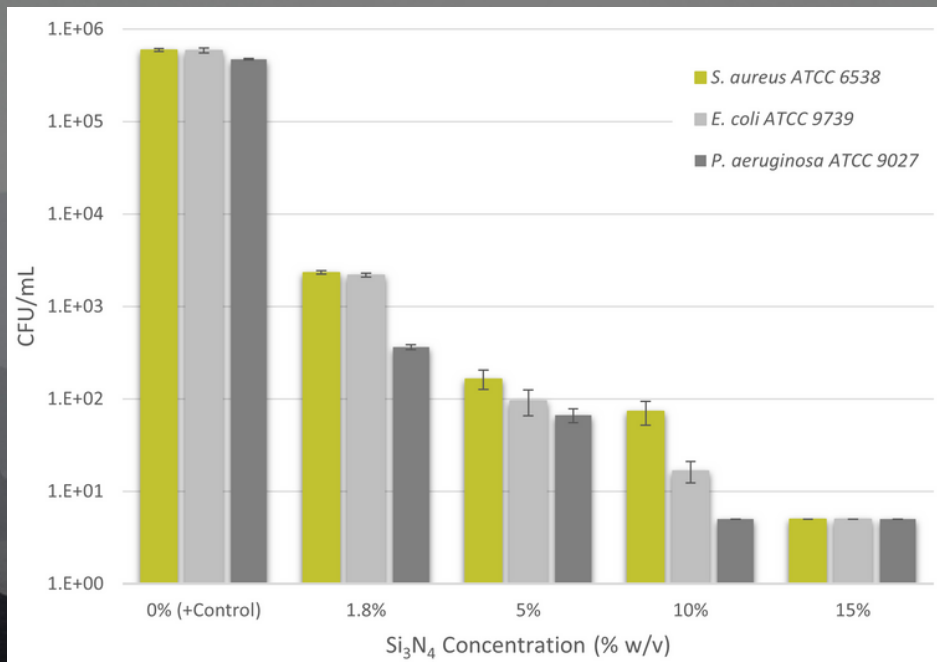
SCANNING ELECTRON MICROSCOPY OF AP<sup>4</sup>



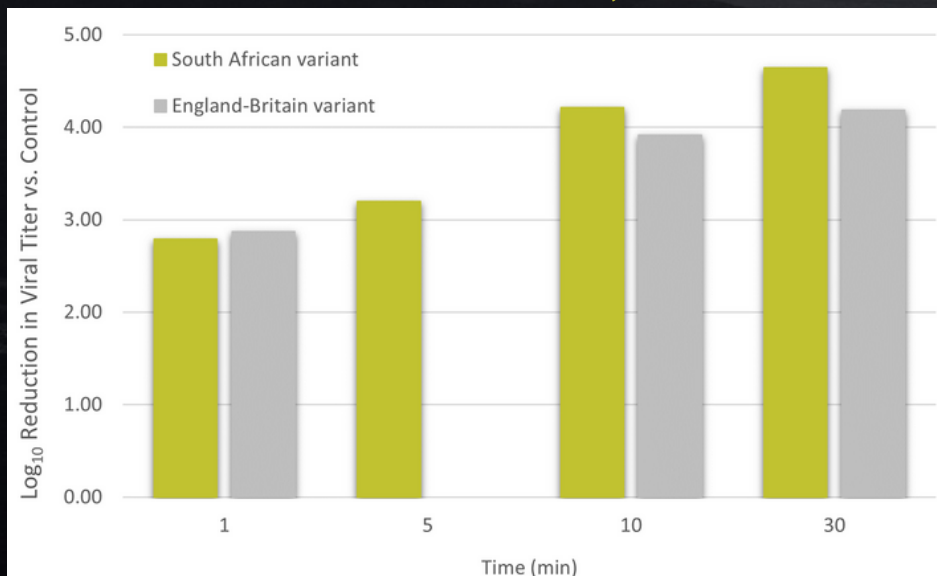
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## AP<sup>4</sup> ANTIBACTERIAL EFFICACY, ASTM E2149



## AP<sup>4</sup> ANTIVIRAL EFFICACY, ISO 18184



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## TECHNICAL DATA FOR AP<sup>4</sup>

Property	Units	Test Method	Typical
Particle Size, D50	µm	ISO 13320	0.6 to 0.8
Nanoparticles, < 100 µm	%	ISO 13320	< 1
Morphology	N/A	SEM	spherical, platelet, irregular, or dendritic
Specific Surface Area	m <sup>2</sup> /g	BET (ISO 9277)	9 to 13
Specific Gravity	-	-	3.15 to 3.25
Purity	wt% Si <sub>3</sub> N <sub>4</sub>	-	98
Isoelectric Point	pH	-	8 to 10
Decomposition Temperature	°C	-	> 1900
Biocompatibility	-	ISO 10993	Pass

## ABOUT SINTX

SINTX Technologies is an OEM ceramics company that develops and commercializes advance ceramics for antipathogenic, biomedical, armor, and industrial applications. SINTX frequently works with customers, partners, and manufacturers to help create new, innovative opportunities across these sectors.

## REFERENCES

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## CONTACT

1885 West 2100 South, Salt Lake City, UT 84119  
855.839.3500 (toll free) | [sintx.com](http://sintx.com)  
Pat. [www.sintx.com/resources/patents](http://www.sintx.com/resources/patents)

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