

Anti-Bacterial(microbial) ZnO film

(Adhesive Type / Non-Adhesive Type)



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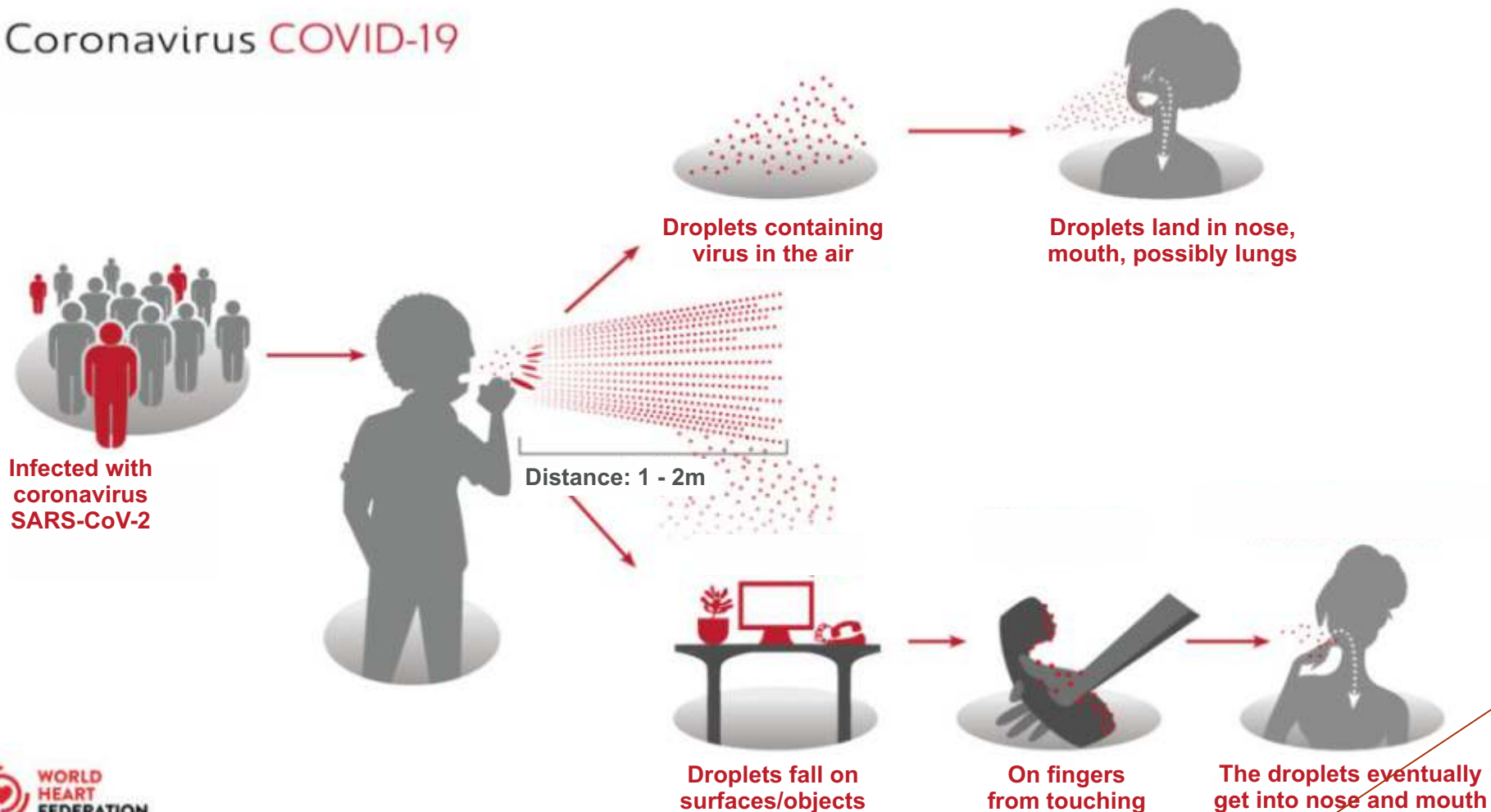
Anti-Bacterial(microbial) ZnO film

- ▶ Virus Transmission and Infection
- ▶ To Protect ourselves and others from COVID-19
- ▶ Introduction of Anti-Bacterial (microbial) Film
- ▶ What is ZnO?
- ▶ The Antibacterial Principle of ZnO
- ▶ Test Report on Zinc Oxide Nanoparticles' Activity against Microbe
- ▶ Characteristic of Antibacterial Film
- ▶ Direction for Use & Precaution
- ▶ Application



Virus Transmission and Infection

Coronavirus COVID-19



To Protect ourselves and others from COVID-19



What else can we do?



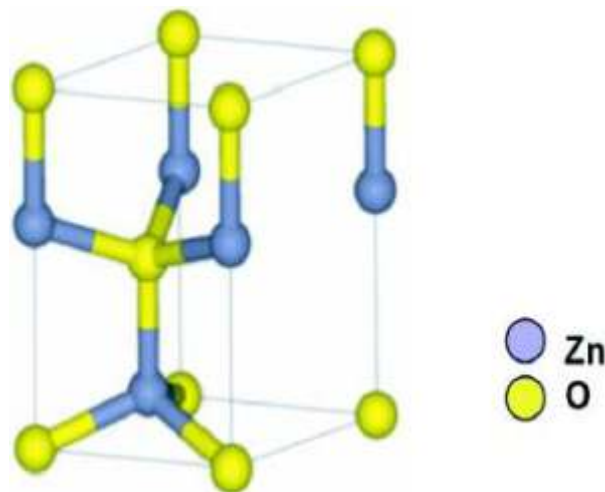
Anti-Bacterial(microbial) Film

Anti Bacterial(microbial) Film has been applied special chemical treatment with ZnO materials on the surface of our films to prevent spreading harmful bacterial & virus in our daily life.



What is ZnO?

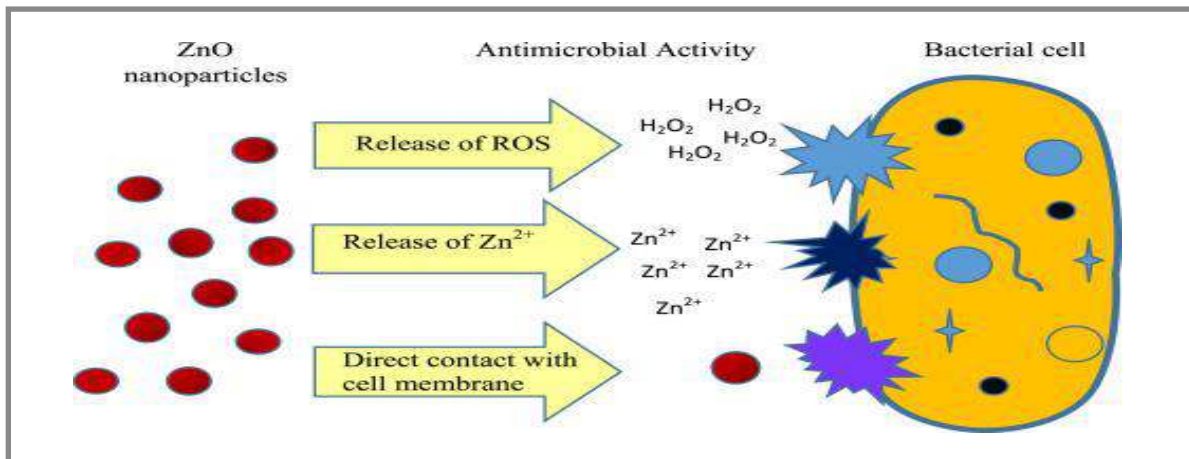
Zinc Oxide (ZnO) nanoparticles are an inorganic compound of Oxygen & Zinc widely used in everyday applications. ZnO is currently listed as a generally recognized as safe (GRAS) material by the FDA (Food and Drug Administration) & EPA (Environmental Protection Agency) and is used as food additive.



The Antibacterial Principle of ZnO

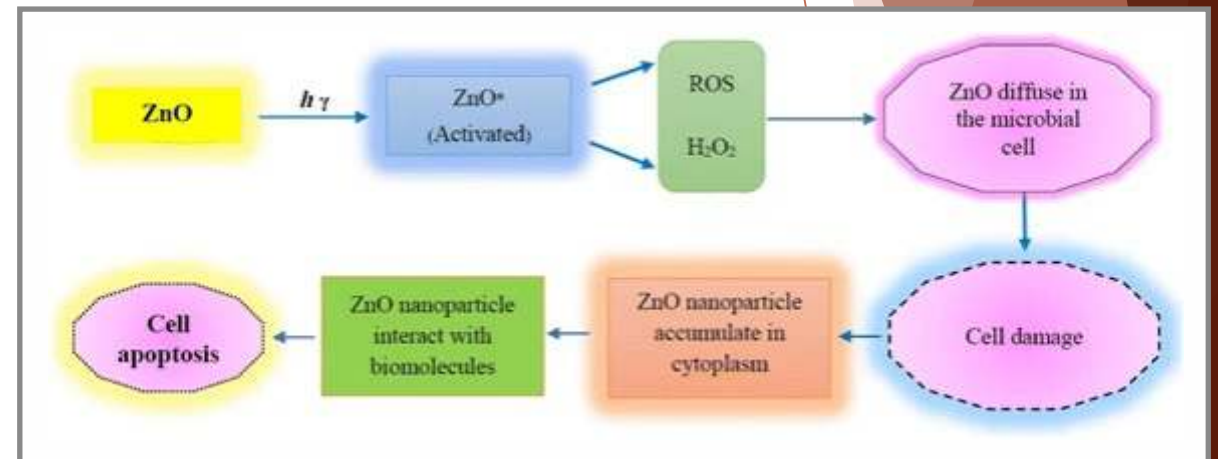
▼ Zinc oxide nanoparticles for water disinfection

(<https://www.sciencedirect.com/science/article/pii/S2468203917300560>)



▲ Properties of Zinc Oxide Nanoparticles and Their Activity Against Microbes

(<https://nanoscalereslett.springeropen.com/articles/10.1186/s11671-018-2532-3#Fig4>)



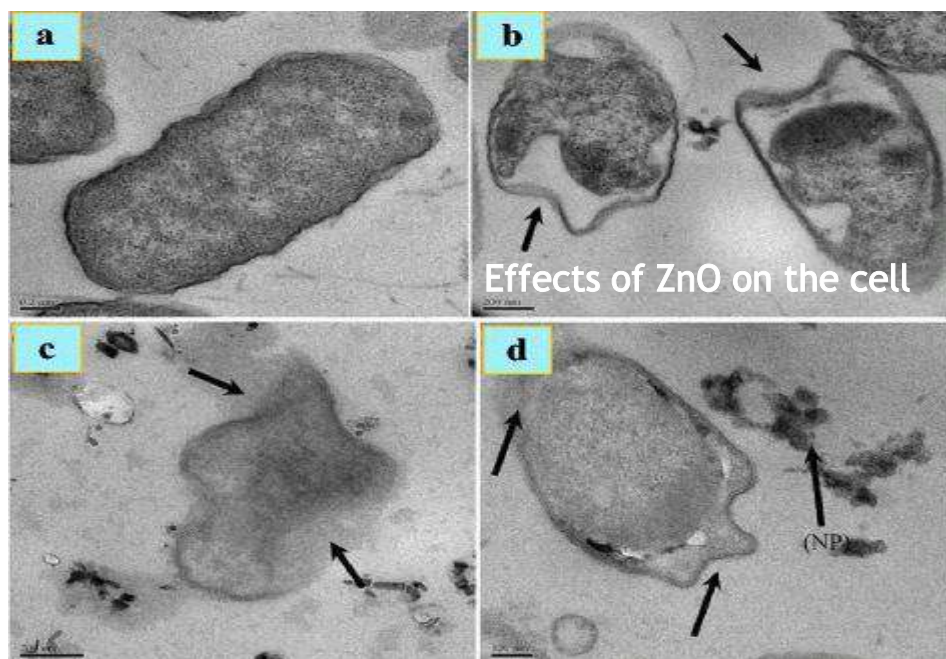
* Four Possible Antibacterial(microbial) Activity

1. Release of ROS
2. Release of Zn²⁺
3. Direct Contact of Nanoparticles with Cell Membrane
4. Photocatalytic Activity

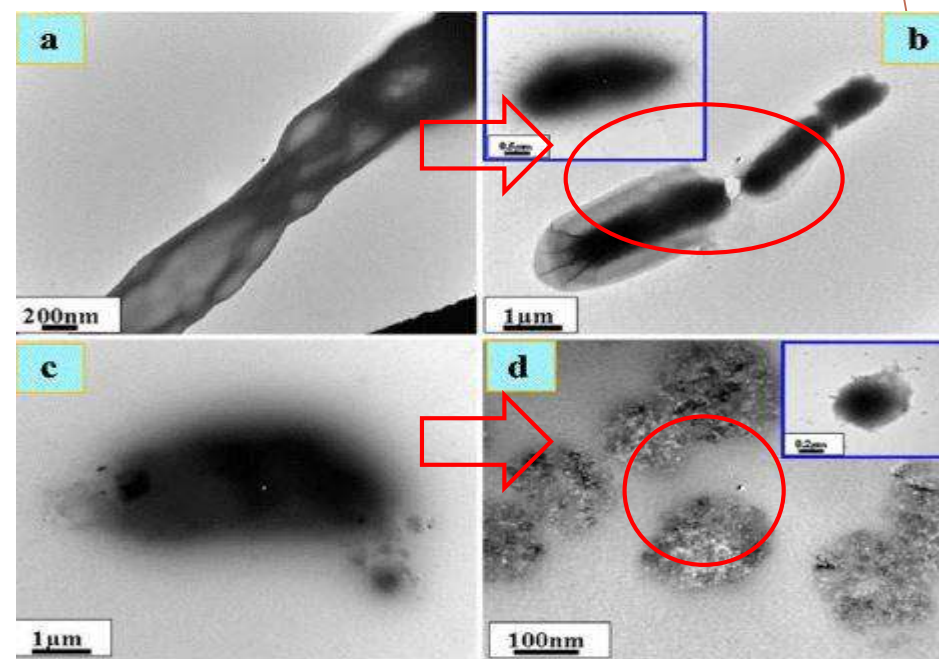


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Test Report on Zinc Oxide Nanoparticles' Activity against Microbe



Salmonella typhimurium



Escherichia coli, Klebsiella pneumoniae

Zinc Oxide nanoparticles have high impact on the cell surface and make the intracellular material leaks out leading to cell death, regardless of the thickness of bacterial cell wall.

Characteristic of Antibacterial Film

	Antibacterial Film	Other Companies' Antibacterial Film
Main Ingredient	Mineral	Heavy Metal
	ZnO, Zinc	Cu, Ag+
Safety	Safe material approved by FDA	Unapproved by FDA
	Pass cytotoxicity test	No data
	Completed SGS, KTR, KCL test	Lack of safety due to heavy metal
Antibacterial side	Both side	Single side
Transparency	High	Low (opaque, copper color)
Curling	Easy to attach without curling	Too strong
Surface	Smooth by nanoparticle	Lack of smoothness

- ▶ PP Based Film (More Durable Than PE Based Film)
- ▶ Vigorous Extermination against Bacteria, Fungus
- ▶ High Transparency
- ▶ Long-Term Anti-Microbial Agents Fighting Effect
- ▶ Semi-Permanent Effect, Applicable on A Wide Range of Usage



Direction for use of Anti-Bacterial Film (Non-Adhesive Type)

- ▶ Take a fresh cleaning cloth and Clean the spot where you attach it without any dust or debris.
- ▶ Cut the film into a proper size according to application.
- ▶ Attach the edge of film by using the double-side transparent tape or clear sticky tape and pressing appropriately to prevent empty spot

Direction for use of Anti (Non-Adhesive Type)

- ▶ Take a fresh cleaning cloth and Clean the spot where you attach it without any dust or debris.
- ▶ Cut the film into a proper size according to application.
- ▶ Remove a silicone backing paper and Apply the film carefully from bottom to up.
- ▶ Use your applicator card or credit card to push bubbles forward until they are removed.

Precaution

- ▶ Just wipe it with a wet tissue or Use water to clean the film and Do not spray any sanitizer or disinfectant. Antibacterial effect may be disappeared by sanitizer...etc.
- ▶ Replace regularly when it is damaged or contaminated.
- ▶ The film durability depends on frequent handling or high visitor frequency. (ex. touching, lifting, pressing...Etc.)



Various Touch Screen Device

✓ ATM (Automated Teller Machine)



✓ Self Check-in Machine in Airport



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Various Touch Screen Device

✓ Self-Checkout Machine



✓ Self Ordering Machine in Restaurant



✓ Information Screen in Department Store



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Various Touch Screen Device

✓ Tablet



✓ Navigation Machine



✓ Signature Pad



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Another Application

✓ Elevator Button



✓ Doorknob in Public Place Or House



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Another Application

✓ Personal Desk Film in School



✓ Cart Handle in Supermarket



Just Attach wherever you want for protection!



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