

Silver Based Inorganic Antimicrobial Agent

# NOVARON<sup>®</sup> AG Series

## What is NOVARON AG

NOVARON AG is an inorganic antimicrobial agent composed of silver based ion exchangers, zirconium phosphates and exhibits an excellent antimicrobial efficacy to a wide spectrum of microorganisms.

## Features

- ☆ NOVARON AG is registered on the list of antibacterial substances of FDA and EPA in USA.
- ☆ The antibacterial activity by silver reveals an effect to various microbes.
- ☆ The uniform fine particle size of 1  $\mu$  m makes NOVARON AG especially suited for fiber spinning.
- ☆ NOVARON AG has excellent heat resistance of 800°C or more and chemical resistance.
- ☆ NOVARON AG has excellent processability due to its low moisture absorption.

## Grade and Characteristic

Grade	Characteristic	Median particle size	Specific gravity
AG300	Standard grade	1.0	3.0
AG1100	Grade with high silver content	1.0	3.0

## Antimicrobial mechanism

The silver taken in in the bacterial cell is considered to annihilate bacteria by inhibiting intracellular metabolism.

## Antimicrobial activity

The minimum density of antimicrobial agent required in order to prevent division of bacteria and multiplication is called minimum inhibitory concentration(MIC). It is shown that antimicrobial efficacy is so high that the value of MIC is small. The following table shows the MIC measurement result by an agar-medium dilution method to various microbes.

Grade	<i>E.coli</i>	O157H7	<i>P.aeruginosa</i>	<i>T.salmonella</i>	<i>S.aureus</i>	MRSA	<i>B.subtilis</i>
AG300	125	200	125	250	250	250	250
AG1100	62.5	62.5	125	62.5	62.5	125	125

## Health and Safety

The high safety of NOVARON AG series is checked by various safety tests.

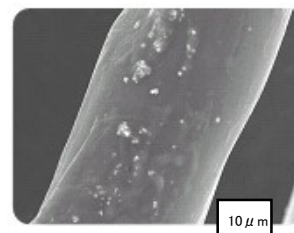
Safety test	AG300	AG1100
Acute oral toxicity(OECD423)	>5,000mg/kg	>5,000mg/kg
Mutagenicity(OECD471)	negative	negative
Primary skin irritation(OECD404)	P.I.I.=0.0	P.I.I.=0.1
Skin sensitization(OECD406)	negative	negative
Cytotoxicity(Japanese pharmacopeia)	69-88 $\mu$ g/mL	22-25 $\mu$ g/mL

## Practical example

### ◆The example of processing to polyester fiber

It was checked that the polyester fiber with 0.5% AG300 which washed 10times by the JIS L0217-103 method is effective by the antibacterial evaluation based on JIS L1902.

	unwashed	after 10 wash
initial number of bacteria	$1.9 \times 10^4$	
number of bacteria after 18 hours	$1.9 \times 10^4$	—
polyester fiber with 0.5% AG300	<20	<20
polyester fiber with 0.5% Siler-glass	<20	$1.9 \times 10^4$



SEM of fiber with NOVARON

## Application example

Daily-use products	cutting board, sink-corner strainer, glass, washbasin, rice paddle, garbage can, slippers, remote control, etc.
Home appliance	refrigerator, washing machine, air cleaner, cleaner, dish washer, rice cooker, mobile phone, television, etc.
Sporting goods/toy	various sporting gear, wear, shoes, doll, clay, origami, block, puzzle, game machine, etc.
Interior goods /building material	wallpaper, flooring material, washstand, kitchen counter, furniture, sealing material, the sand of a sandbox, etc.
Textile	clothing, bedding, various fatigue uniforms, military uniform, white robe, glove, mask, towel, curtain, carpet, etc.



AG300, AG1100 have  
the certification results as the SEK mark  
antibacterial finishing agent.



NOVARON listed in this sheet fits SIAA mark.

## Packing

5 kg or 10 kg enters (carton box containing aluminum coat bag).

## Cautions

- Keep container tightly closed and store it at room temperature.
- Use local exhaust ventilation, dust proof masks, protective glasses, or protective gloves in case of need.
- If eye contact occurs, flush well with plenty of water for at least 15mins and seek advice from a doctor.
- If skin contact occurs, wash material off with soap and water.
- Before use in a production line, conduct preliminary tests to ascertain the antimicrobial effect and the extent of other unexpected ill-effect such as discoloration, if any, on the specific materials used, since the performance of NOVARON may vary by materials and conditions of the application and use.
- Observe legal regulations and restriction on each specific use of NOVARON.

★ Please refer to material safety data sheet in which our company publishes a product about the safety in the case of carrying out storage, use, and abandonment. etc.

★ Data and information in this technical report are based on our test results or published articles. Customer results are not guaranteed. We recommend you conduct tests to evaluate it is suitable for your particular application.



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