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## Introduction

AgPolymer has developed a cheese coating with silver. The coating is a water dispersion of a vinylacetate-ethylene copolymer containing 5000 ppm silver zeolite A from Agion USA. The silver-ions act as antimicrobials and should prevent the cheese from microbiological spoilage.

TNO has performed a microbiological test to investigate the antimicrobial properties of the AgPolymer coating.

AgPolymer has made available to TNO two samples:

- a sample of cheese coating with silver-ions (TNO code 3119-08-0818)
- a sample of cheese coating without silver-ions (TNO code 3119-08-0819)

## Method

Two microbial tests are performed to test inhibition of moulds and bacteria.

**Mould test:**

Malt extract agar (MEA) is prepared and poured into Petri-dishes. On top 0.1 ml of mould inoculum is spread, aiming for an initial level of 10 – 50 moulds. Then 2 gram coating is spread on top. The plates are incubated at 25°C for 7 days. Mould growth is visually checked.

The test is performed using three moulds frequently implicated in cheese spoilage: *Penicillium discolor*, *Aspergillus versicolor* and *Aspergillus niger*.

***Listeria monocytogenes* test:**

Tryptic soy agar (TSA) is prepared and poured into Petri-dishes. On top 0.1 ml of bacterial suspension is spread, aiming for an initial level of 100 cells. Then 2 gram coating is spread on top. The plates are incubated at 30°C for 3 days. Bacterial growth is visually checked.

The test is performed using *Listeria monocytogenes* ATCC 19114. *Listeria monocytogenes* is a pathogenic bacterium implicated in the past in food infection by consumption of contaminated cheese.

## Results

Mould inhibition test on agar (see also pictures on next page)

- The coating of AgPolymer showed no growth of all three moulds tested (only a few colonies outside the coating).
- The control coating of AgPolymer without silver and the control agar showed growth of all three moulds tested.

*Listeria monocytogenes* inhibition test on agar (see also pictures on next page)

- The coating of AgPolymer showed no growth of *Listeria monocytogenes*.
- The control coating of AgPolymer without silver and the control agar showed growth of *Listeria monocytogenes*.

## Conclusion

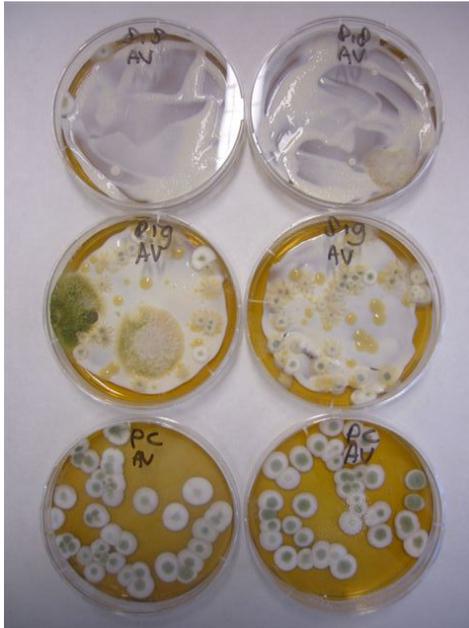
The coating of AgPolymer containing silver is very effective to inhibit growth of moulds and *Listeria monocytogenes* under the applied test conditions.

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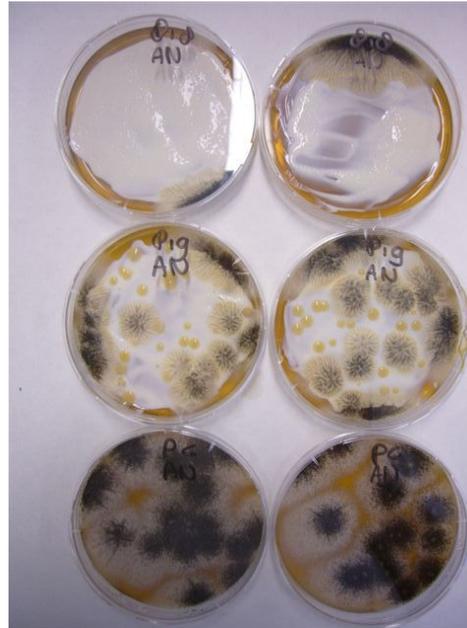
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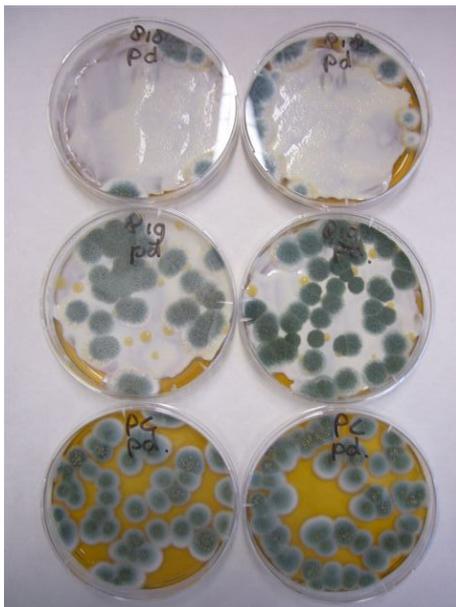
**Pictures**



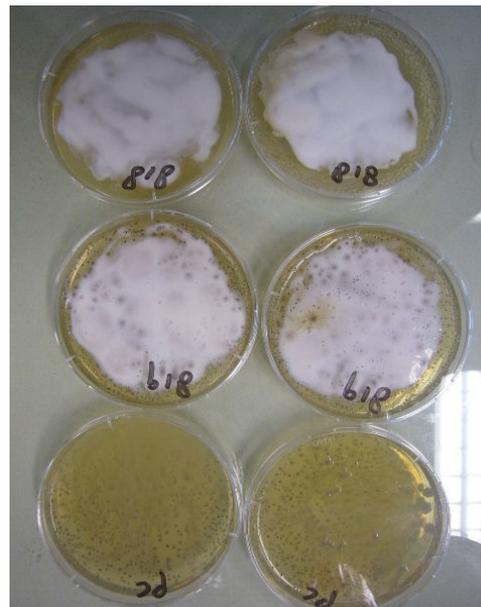
*Aspergillus versicolor*



*Aspergillus niger*



*Penicillium discolor*



*Listeria monocytogenes*

3119-08-0818 = Ag polymer (with silver)  
3119-08-0819 = control Ag polymer without silver  
PC = positive control on agar media