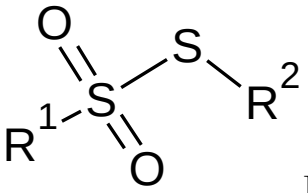
into the body, leading to a chronic systemic infection. Candida albicans (a yeast) is the most common fungal biofilm found in hospitals, but is extremely difficult to treat and do not respond well to typical antifungal treatments.

The pioneering studies in bacterial biofilm formation focused on Staphylococcus aureus (Gram-positive) and Pseudomonas aeruginosa (Gram-negative) because of their involvement in recurrent mastitis in dairy cattle and complicated wound infections. In addition, biofilm formation of Streptococcus ssp., avian pathogenic E. coli (APEC) and C. jejuni biofilm gained attention, as these bacterial species are of public health relevance. Subsequently, other important animal pathogens, including Actinobacillus pleuropneumoniae (severe lung infections in swine that might become lethal), Escherichia coli (local and systemic infections and systemic septicaemia, which often is a lethal in poultry), skin and enteric diseases in dogs and cats and wound infections and endometritis in horses were recognized as biofilm infections. This list is non-exclusive as biofilm formation is a general trait of almost all micro-organisms.

Accordingly, a need exists for alternative treatments of biofilm-related disorders.

SUMMARY

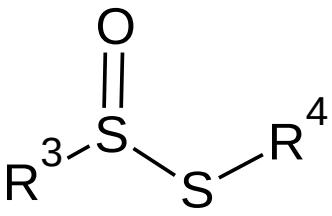
In an aspect, there is provided a use of a compound according to formula I



Formula I

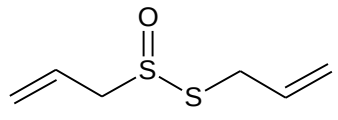
wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or a composition comprising the compound according to formula I, wherein the composition is substantially free of diallyl thiosulfinate, in the manufacture of a medicament for the treatment of a biofilm-related disorder.

In another aspect, there is provided a use of a compound according to according to formula II



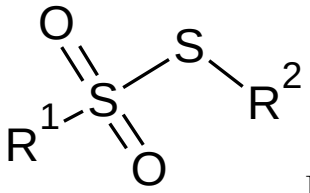
Formula II

wherein R3 and R4 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula II is not



, preferably wherein the compound is propyl-propane-thiosulfinate (PTS), or a composition comprising the compound according to formula II, wherein the composition is substantially free of diallyl thiosulfinate, in the manufacture of a medicament for the treatment of a biofilm-related disorder.

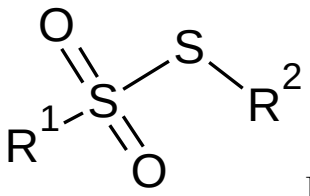
In another aspect, there is provided an article having a surface at least partially coated with a composition comprising a compound according to formula I



Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate, preferably, wherein the article is a cleaning product, medical device, or surgical device.

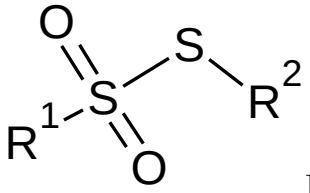
In another aspect, there is provided an in vitro method for preventing or reducing biofilm formation or growth on a surface or for degrading or reducing biofilms on a surface,
said method comprising applying a composition to the surface such as to prevent or reduce biofilm formation or growth on a surface,
or such as to degrade or reduce biofilms on a surface, wherein said composition comprises a compound according to formula I



Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate.

In another aspect, there is provided a composition comprising a compound according to formula I

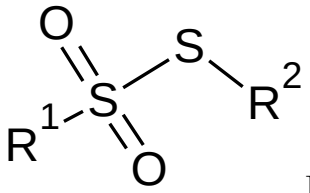


Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate, and wherein the composition is a pharmaceutical composition or a functional food.

The disclosure provides the following preferred examples.

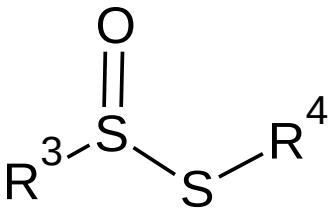
1. A compound according to formula I



Formula I

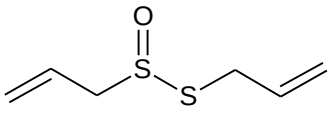
wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or a composition comprising the compound according to formula I, preferably wherein the composition is substantially free of diallyl thiosulfinate,
for use in the treatment of a biofilm-related disorder.

2. The compound or composition for use according to example 1, wherein the compound is propyl-propane thiosulfonate (PTSO).
3. The compound or composition for use according to example 1, further comprising a compound for use according to formula II



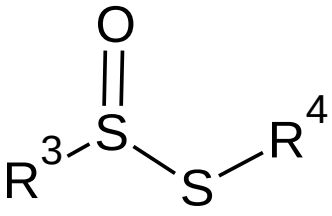
Formula II

wherein R3 and R4 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula II is not



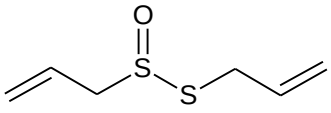
, preferably wherein the compound according to formula II is propyl-propane-thiosulfinate (PTS).

4. A compound according to according to formula II



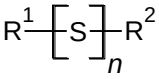
Formula II

wherein R3 and R4 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula II is not



, preferably wherein the compound is propyl-propane-thiosulfinate (PTS), or a composition comprising the compound according to formula II, preferably wherein the composition is substantially free of diallyl thiosulfinate, for use in the treatment of a biofilm-related disorder.

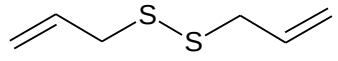
5. The compound or composition for use according to any one of the preceding examples, further comprising a compound having Formula III



Formula III,

wherein n is 1, 2, or 3 and R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched

alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl,
provided that Formula III is not



.

6. The compound or composition for use according to any one of the preceding examples, wherein the use further comprises the administration of an antimicrobial agent, preferable selected from an antifungal or an antibiotic.

7. The compound or composition for use according to any one of the preceding examples, wherein the use further comprises the administration of an anti-inflammatory agent.

8. The compound or composition for use according to any one of the preceding examples, wherein the treatment is for the reduction of biofilm formation or growth and/or for the degradation or reduction of biofilms.

9. The compound or composition for use according to any one of the preceding examples, wherein the biofilm-related disorder is a chronic and/or persistent infection.

10. The compound or composition for use according to any one of the preceding examples, wherein the biofilm-related disorder is digital dermatitis or a chronic wound infection.

11. The compound or composition for use according to any one of the preceding examples, wherein the biofilm-related disorder is an infection of the mammary gland, preferably wherein the biofilm-related disorder is mastitis.

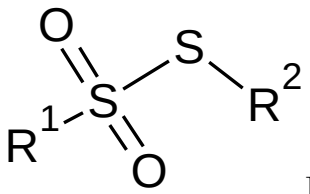
12. The compound or composition for use according to any one of the preceding examples, wherein the treatment is for a mammal.

13. The compound or composition for use according to any one of the preceding examples, wherein the treatment is for a ruminant, preferably a cow.

14. The compound or composition for use according to any one of the preceding examples, wherein the composition is substantially free of diallyl thiosulfinate.

15. The compound or composition for use according to any one of the preceding examples, wherein the biofilm comprises bacteria, yeast, fungi, microalgae, or a combination thereof.

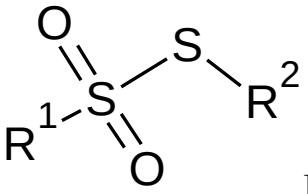
16. A method for treating a biofilm-related disorder in an individual, said method comprising administering to an individual in need thereof a composition comprising a compound according to formula I



Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl,
preferably wherein the compound is propyl-propane thiosulfonate (PTSO),
wherein the composition is substantially free of diallyl thiosulfinate.

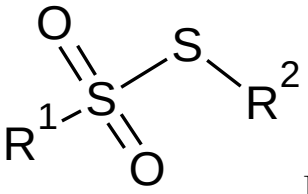
17. An article having a surface at least partially coated with a composition comprising a compound according to formula I



Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate, preferably, wherein the article is a cleaning product, medical device, or surgical device.

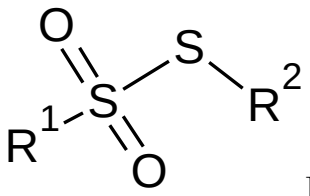
18. An in vitro method for preventing or reducing biofilm formation or growth on a surface or for degrading or reducing biofilms on a surface,
said method comprising applying a composition to the surface such as to prevent or reduce biofilm formation or growth on a surface,
or such as to degrade or reduce biofilms on a surface, wherein said composition comprises a compound according to formula I



Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate.

19. A composition comprising a compound according to formula I



Formula I

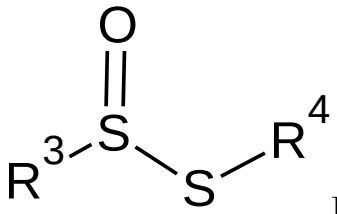
wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate, and wherein the composition is a pharmaceutical composition or a functional food.

20. The article, method, or composition according to any one of examples 16-19, wherein the compound is PTSO.

21. The article, method, or composition according to any one of examples 16-20, wherein the composition further comprises an antimicrobial agent, preferable selected from an antifungal or an antibiotic.

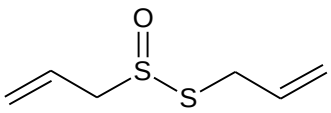
22. The article, method, or composition according to any one of examples 16-21, wherein the composition further comprises anti-inflammatory agent.

23. The article, method, or composition according to any one of examples 16-22, wherein the composition further comprises a compound according to formula II

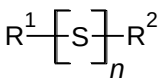


Formula II

wherein R3 and R4 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula II is not



and/or the composition further comprises a compound having Formula III

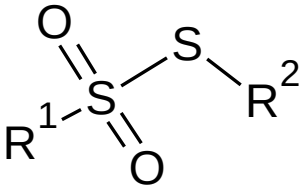


Formula III,

wherein n is 1, 2, or 3 and R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched

Claims

1. Use of a compound according to formula I

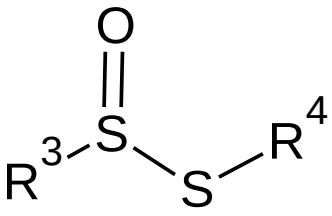


Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, or a composition comprising the compound according to formula I, wherein the composition is substantially free of diallyl thiosulfinate, in the manufacture of a medicament for the treatment of a biofilm-related disorder.

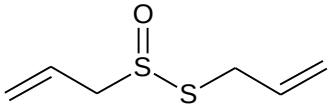
2. The use according to claim 1, wherein the compound is propyl-propane thiosulfonate (PTSO).

3. The use according to claim 1, further comprising a compound for use according to formula II



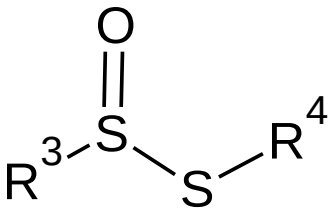
Formula II

wherein R3 and R4 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula II is not



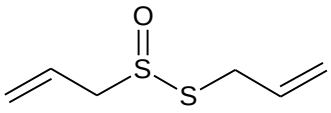
, preferably wherein the compound according to formula II is propyl-propane-thiosulfinate (PTS).

4. Use of a compound according to according to formula II



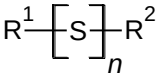
Formula II

wherein R3 and R4 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula II is not



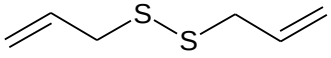
, preferably wherein the compound is propyl-propane-thiosulfinate (PTS), or a composition comprising the compound according to formula II, wherein the composition is substantially free of diallyl thiosulfinate, in the manufacture of a medicament for the treatment of a biofilm-related disorder.

5. The use according to any one of the preceding claims, further comprising a compound having Formula III



Formula III,

wherein n is 1, 2, or 3 and R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula III is not



.

6. The use according to any one of the preceding claims, wherein the use further comprises an antimicrobial agent to be administered, preferable selected from an antifungal or an antibiotic.

7. The use according to any one of the preceding claims, wherein the use further comprises an anti-inflammatory agent to be administered.

8. The use according to any one of the preceding claims, wherein the treatment is for the reduction of biofilm formation or growth and/or for the degradation or reduction of biofilms.

9. The use according to any one of the preceding claims, wherein the biofilm-related disorder is a chronic and/or persistent infection.

10. The use according to any one of the preceding claims, wherein the biofilm-related disorder is digital dermatitis or a chronic wound infection.

11. The use according to any one of the preceding claims, wherein the biofilm-related disorder is an infection of the mammary gland, preferably wherein the biofilm-related disorder is mastitis.

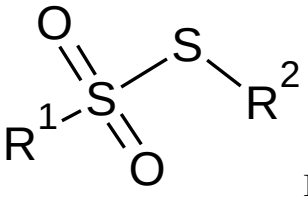
12. The use according to any one of the preceding claims, wherein the treatment is for a mammal.

13. The use according to any one of the preceding claims, wherein the treatment is for a ruminant, preferably a cow.

14. The use according to any one of the preceding claims, wherein the composition is substantially free of diallyl thiosulfinate.

15. The use according to any one of the preceding claims, wherein the biofilm comprises bacteria, yeast, fungi, microalgae, or a combination thereof.

16. An article having a surface at least partially coated with a composition comprising a compound according to formula I

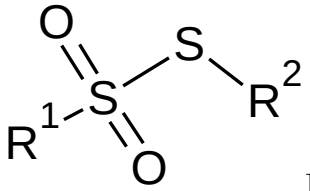


Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate, preferably, wherein the article is a cleaning product, medical device, or surgical device.

17. An in vitro method for preventing or reducing biofilm formation or growth on a surface or for degrading or reducing biofilms on a surface,
said method comprising applying a composition to the surface such as to prevent or reduce biofilm formation or growth on a surface,

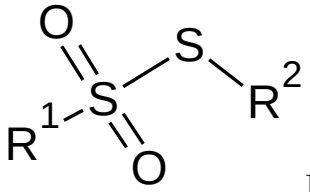
or such as to degrade or reduce biofilms on a surface, wherein said composition comprises a compound according to formula I



Formula I

wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate.

18. A composition comprising a compound according to formula I



Formula I

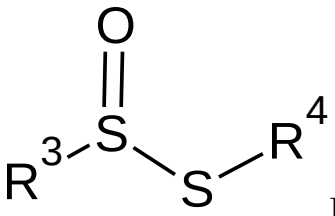
wherein R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, wherein the composition is substantially free of diallyl thiosulfinate, and wherein the composition is a pharmaceutical composition or a functional food.

19.The article, method, or composition according to any one of claims 16-18, wherein the compound is PTSO.

20. The article, method, or composition according to any one of claims 16-19, wherein the composition further comprises an antimicrobial agent, preferable selected from an antifungal or an antibiotic.

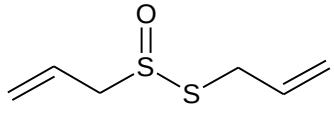
21. The article, method, or composition according to any one of claims 16-20, wherein the composition further comprises anti-inflammatory agent.

22. The article, method, or composition according to any one of claims 16-21, wherein the composition further comprises a compound according to formula II

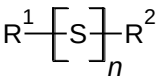


Formula II

wherein R3 and R4 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula II is not

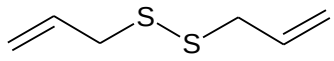


and/or the composition further comprises a compound having Formula III



Formula III,

wherein n is 1, 2, or 3 and R1 and R2 are independently selected from optionally substituted linear or branched alkyl, optionally substituted linear or branched alkenyl, optionally substituted linear or branched alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted heterocycloalkyl, provided that Formula III is not



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