filters and orifices. Biofilm and biofilm organisms also cause corrosion of pipeline and petroleum process equipment. These problems can be manifested throughout an oil or gas production facility to the point where fouling and corrosive biofilm organisms have even been found on the surfaces of final product storage tanks.

[0007] In the home, biofilms are found in or on any surface that supports microbial growth, e.g., in drains, on food preparation surfaces, in toilets and in swimming pools and spas.

[0008] Biofilms are implicated in a wide range of water processes, both domestic and industrial. They can grow on the surface of process equipment and impede the performance of the equipment, such as degradation of heat transfer or plugging of filters and membranes. Biofilms growing on cooling tower fill can add enough weight to cause collapse of the fill. Biofilms cause corrosion of even highly specialized stainless steels. Biofilms in a water process can degrade the value of a final product. Biofilms growing in drinking water distribution systems can harbor potential pathogenic organisms, corrosive organisms or bacteria that degrade the aesthetic quality of the water.

[0009] Thus, a need exists to break through the protective barrier of biofilms to treat or kill the associated bacterial infections and clear them from surfaces and in water systems. This disclosure satisfies this need and provides related advantages as well.

SUMMARY

[009a] In one aspect, the present disclosure refers to an isolated B Box polypeptide consisting of an amino acid sequence as shown in SEQ ID NO: 12.

[009b] In another aspect, the present disclosure refers to an antibody that recognizes and binds an isolated polypeptide as described herein or an antigen binding fragment of the antibody.

[009c] In another aspect, the present disclosure refers to a composition comprising a carrier and one or more isolated polypeptide as described herein, or an antibody or antigen binding fragment that recognizes and binds the isolated polypeptide, or an isolated host cell comprising one or more of: the isolated polypeptide, the antibody or antigen binding fragment, a polynucleotide encoding the isolated polypeptide or the antibody or antigen binding fragment, a complement of the polynucleotide, or a vector comprising the polynucleotide.

[009d] In another aspect, the present disclosure refers to a polynucleotide encoding the isolated polypeptide as described herein or the complement of the polynucleotide.

[009e] In another aspect, the present disclosure refers to a vector comprising the polynucleotide as described herein.

[009f] In yet another aspect, the present disclosure refers to an isolated host cell comprising one or more of: the isolated polypeptide as described herein, an antibody or antigen binding fragment that recognizes and binds the isolated polypeptide, a polynucleotide encoding the isolated polypeptide or the antibody or antigen binding fragment, a complement of the polynucleotide, or a vector comprising the polynucleotide.

[009g] In yet another aspect, the present disclosure refers to an isolated B Box polypeptide prepared by growing a prokaryotic cell expressing an isolated polynucleotide encoding the isolated polypeptide as described herein under conditions for expression of the polynucleotide and isolated the polypeptide.

[009h] In yet another aspect, the present disclosure refers to an *ex vivo* method for inhibiting, competing or titrating the binding of a DNABII polypeptide or protein to a microbial DNA, comprising contacting the DNABII polypeptide or protein or the microbial DNA with the isolated polypeptide as described herein, thereby inhibiting, competing or titrating the binding of the DNABII protein or polypeptide to the microbial DNA.

[009i] In yet another aspect, the present disclosure refers to an *ex vivo* method for inhibiting, preventing or breaking down a microbial biofilm, comprising contacting the biofilm with the isolated polypeptide as described herein, thereby inhibiting, preventing or breaking down the microbial biofilm.

[009j] In yet another aspect, the present disclosure refers to a use of the isolated polypeptide as described herein in the manufacture of a medicament for one or more of the following: (a) inhibiting, preventing or breaking down a bacterial biofilm in a subject, (b) inhibiting, preventing or treating a microbial infection that produces a bacterial biofilm in a subject, (c) disrupting a bacterial biofilm and clearance thereof that does not enhance or induce an inflammatory response in a subject in need thereof, or (d) treating an infection or disorder incident to the presence of a bacterial biofilm in a subject in need thereof,

wherein the polypeptide is to be administered into the subject, thereby (a') inhibiting, preventing or breaking down the bacterial biofilm, (b') inhibiting, preventing or treating a microbial infection that

produces the bacterial biofilm in the subject, (c') disrupting the bacterial biofilm and clearance thereof that does not enhance or induce an inflammatory response, or (d') treating the infection or disorder incident to the presence of the bacterial biofilm in the subject, respectively.

[009k] In yet another aspect, the present disclosure refers to a kit comprising one or more of: the isolated polypeptide as described herein, an antibody or antigen binding fragment that recognizes and binds the isolated polypeptide, a polynucleotide encoding the isolated polypeptide or the antibody or antigen binding fragment, or a complement of the polynucleotide and instructions for use.

[009l] In yet another aspect, the present disclosure refers to the isolated polypeptide as described herein for use in therapy.

[0010] Bacterial biofilms are notoriously recalcitrant to existing treatment modalities (for example they are >1000 fold more resistant to antimicrobials than their planktonic counterparts). Given the high prevalence and the enormous consequences in terms of attributable mortality and economic burden of biofilm-mediated infections, novel therapeutic approaches are urgently needed. One of the defining characteristics of a biofilm is the extracellular polymeric substance, in which biofilm cells are embedded. Key components of the extracellular polymeric substance are extracellular DNA and bacterial DNABII family of proteins, which are crucial to biofilms' structural integrity. Targeting and sequestration of DNABII proteins can disrupt biofilms. High Mobility Group B1 (HMGB1) protein is a DNA-binding eukaryotic protein that binds to the same DNA structures as the DNABII proteins, causing, disruption of bacterial biofilms. Derivatives of HMGB1 can be engineered to possess the same efficacious anti-biofilm activity but are smaller and do not induce inflammation.

What is claimed is:

1. An isolated B Box polypeptide consisting of an amino acid sequence as shown in SEQ ID NO: 12.

2. An antibody that recognizes and binds an isolated polypeptide of claim 1 or an antigen binding fragment of the antibody.

3. A composition comprising a carrier and one or more isolated polypeptide of claim 1 or an antibody or antigen binding fragment that recognizes and binds the isolated polypeptide, or an isolated host cell comprising one or more of: the isolated polypeptide, the antibody or antigen binding fragment, a polynucleotide encoding the isolated polypeptide or the antibody or antigen binding fragment, a complement of the polynucleotide, or a vector comprising the polynucleotide.

4. A polynucleotide encoding the isolated polypeptide of claim 1 or the complement of the polynucleotide.

5. A vector comprising the polynucleotide of claim 4.

6. An isolated host cell comprising one or more of: the isolated polypeptide of claim 1, an antibody or antigen binding fragment that recognizes and binds the isolated polypeptide, a polynucleotide encoding the isolated polypeptide or the antibody or antigen binding fragment, a complement of the polynucleotide, or a vector comprising the polynucleotide.

7. An isolated B Box polypeptide prepared by growing a prokaryotic cell expressing an isolated polynucleotide encoding the isolated polypeptide of claim 1 under conditions for expression of the polynucleotide and isolated the polypeptide.

8. The isolated B Box polypeptide of claim 7, wherein the prokaryotic cell is an *E. coli* cell.

9. An *ex vivo* method for inhibiting, competing or titrating the binding of a DNABII polypeptide or protein to a microbial DNA, comprising contacting the DNABII polypeptide or protein or the microbial DNA with the isolated polypeptide of any one of claims 1, 7 or 8, thereby inhibiting, competing or titrating the binding of the DNABII protein or polypeptide to the microbial DNA.

10. An *ex vivo* method for inhibiting, preventing or breaking down a microbial biofilm, comprising contacting the biofilm with the isolated polypeptide of any one of claims 1, 7 or 8, thereby inhibiting, preventing or breaking down the microbial biofilm.

11. Use of the isolated polypeptide of any one of claims 1, 7 or 8, in the manufacture of a medicament for one or more of the following: (a) inhibiting, preventing or breaking down a bacterial biofilm in a subject, (b) inhibiting, preventing or treating a microbial infection that produces a bacterial biofilm in a subject, (c) disrupting a bacterial biofilm and clearance thereof that does not enhance or induce an inflammatory response in a subject in need thereof, or (d) treating an infection or disorder incident to the presence of a bacterial biofilm in a subject in need thereof,

wherein the polypeptide is to be administered into the subject, thereby (a') inhibiting, preventing or breaking down the bacterial biofilm, (b') inhibiting, preventing or treating a microbial infection that produces the bacterial biofilm in the subject, (c') disrupting the bacterial biofilm and clearance thereof that does not enhance or induce an inflammatory response, or (d') treating the infection or disorder incident to the presence of the bacterial biofilm in the subject, respectively.

12. The use of claim 11, wherein the biofilm is produced by an organism selected from the group of uropathogenic *Escherichia coli* (UPEC), *Klebsiella pneumonia*, *Burkholderia cenocepacia, S. epidermidis*, *Streptococcus agalactiae, Neisseria meningitidis, Treponemes, denticola, pallidum), Burkholderia cepacia, Burkholderia pseudomallei*, *Haemophilus influenzae* (nontypeable)(NTHI), *Moraxella catarrhalis*, *Streptococcus pneumoniae*, *Streptococcus pyogenes*, *Mycobacterium tuberculosis* or an ESKAPE pathogen.

13. The use of claim 12, wherein an antimicrobial is to be further administered into the subject.

14. A kit comprising one or more of: the isolated polypeptide of any one of claims 1, 7, or 8, an antibody or antigen binding fragment that recognizes and binds the isolated polypeptide, a polynucleotide encoding the isolated polypeptide or the antibody or antigen binding fragment, or a complement of the polynucleotide and instructions for use.

15. The isolated polypeptide of any one of claims 1, 7, or 8 for use in therapy.