SUMMARY

[0006] The present disclosure provides hard surface treatment compositions comprising: an antimicrobial component comprising at least one quaternary ammonium compound; a synthetic polymer comprising: at least one cationic monomer A_b, optionally, at least one anionic monomer B_a, and optionally, at least one non-ionic monomer C_a; an organic acid; and a surfactant selected from cationic surfactants, amphoteric surfactants and combinations thereof, wherein the composition is free of non-ionic surfactants. Also presented are methods of providing a surface with residual antimicrobial action that include the step of applying a composition of the present disclosure to the surface. The present disclosure also provides a substrate with residual antimicrobial action comprising a substrate wherein at least a portion of the substrate is coated with a composition of the present disclosure.

[0006a] In one aspect, there is provided a hard surface treatment concentrate composition comprising an antimicrobial component comprising at least one quaternary ammonium compound in an amount ranging from 800 ppm to about 40,000 ppm; a synthetic polymer in an amount ranging from about 800 ppm to about 30,000 ppm comprising at least one cationic monomer A_b, optionally, at least one anionic monomer B_a, and optionally, at least one non-ionic monomer C_a; an organic acid in an amount ranging from about 1,000 ppm to about 35,000 ppm; and a surfactant selected from the group consisting of cationic surfactants, amphoteric surfactants and combinations thereof in an amount ranging from about 2,000 ppm to about 90,000 ppm, wherein the composition is free of non-ionic surfactants.

[0006b] In another aspect, there is provided a method of providing a surface with residual antimicrobial action that comprises the step of applying the composition as described herein to the surface.

[0006c] In yet another aspect, there is provided a substrate with residual antimicrobial action comprising a substrate wherein at least a portion of the substrate is coated with the composition described herein.

[0006d] In a further aspect, there is provided a use of a composition as described herein to substantially reduce or control the formation of microbial colonies on or at a surface.

DETAILED DESCRIPTION

[0007] The present disclosure relates to compositions that provide a longer lasting disinfection to treated surfaces and are free of non-ionic surfactants. The present compositions achieve microorganism (e.g. bacterial, viral, or fungal) kill of at least 95% or greater, (e.g. 99.9% kill), for 12 to 24 hours obviating the need for repeated treatment. In order to substantiate 24 hour long-term sanitization claims with the United States Environmental Protection Agency (EPA), compositions are evaluated with the residual self-sanitization (RSS) method, EPA Protocol # 01-1A (https://www.epa.gov/sites/production/files/2015-09/documents/cloroxpcol_final.pdf). For validating longer term disinfection, all extant test protocols emulate the maximum amount of recontamination and abrasion by touching and wiping anticipated before reapplication, typically a 24 hour period. An intermediate protocol with approximately half the level abrasion and re-soiling challenge to a surface is presented here as the "RSS-12h" test protocol.

[0008] In an embodiment, a film formed from the composition kills at least 99.9% (e.g. log 3 reduction) of microorganisms according to the residual self-sanitizing (RSS) activity test (EPA Protocol #01-1A). In an embodiment, a film formed from the composition kills at least 99.9% (e.g. log 3 reduction) of gram-positive bacteria and