CLAIMS:

1. An anti-fouling composition for inhibiting fouling of a structural part in a petroleum-refining system exposed to a hydrocarbon fluid, the anti-fouling composition comprising:

an effective amount of a resin comprising an alkyl phenol-aldehyde resin; and

an effective amount of a polyolefin comprising a polyalkylene ester, polyolefin amide alkeneamine, ~~polyethylene polyamine, polyalkyleneimine,~~ or a combination thereof,

wherein the anti-fouling composition inhibits fouling of a structural part in a petroleum-refining system exposed to a hydrocarbon fluid.

2. The anti-fouling composition of claim 1, the composition further comprising an effective amount of a polyalkylene imide, an amine-substituted polyalkylene imide, or a combination thereof.

3. The anti-fouling composition of claim 1 or 2, the composition further comprising an effective amount of a chelating compound comprising N,N'-disalicylidene-1,2-propanediamine.

4. The anti-fouling composition of any one of claims 1 to 3, wherein the alkyl phenol-aldehyde resin comprises an alkyl phenol-formaldehyde resin.

5. The anti-fouling composition of ~~any one of claims 1 to~~claim 4, wherein the alkyl phenol-aldehyde resin comprises a C_1-C_{20} alkyl phenol-aldehyde resin.

~~6. The anti-fouling composition of claim 5, wherein the alkyl phenol-aldehyde resin comprises a C_1-C_{16} alkyl phenol-aldehyde resin.~~

~~7. The anti-fouling composition of claim 5, wherein the alkyl phenol-aldehyde resin comprises a C_1-C_{12} alkyl phenol-aldehyde resin.~~

~~8. The anti-fouling composition of claim 5, wherein the alkyl phenol-aldehyde resin comprises a C_3-C_{12} alkyl phenol-aldehyde resin.~~

~~9. The anti-fouling composition of claim 5, wherein the alkyl phenol-aldehyde resin comprises a C_6-C_{12} alkyl phenol-aldehyde resin.~~

~~10~~6. The anti-fouling composition of claim 5, wherein the alkyl phenol-aldehyde resin comprises a nonyl phenol-formaldehyde resin.

~~11~~7. The anti-fouling composition of any one of claims 1 to ~~10~~6, comprising the polyalkylene ester, wherein the polyalkylene ester comprises a polyalkylene succinic ester, a polyalkylene succinic anhydride, polyalkylene succinic acid, or a combination thereof.

~~12~~8. The anti-fouling composition of claim ~~11~~7, wherein the polyalkylene ester comprises a polyethylene succinic ester, a polyethylene succinic anhydride, a polyethylene succinic acid, a polypropylene succinic ester, a polypropylene succinic anhydride, a polypropylene succinic acid, a polyisobutylene succinic ester, a polyisobutylene succinic anhydride, a polyisobutylene succinic acid, or a combination thereof.

~~13~~9. The anti-fouling composition of claim ~~11~~7, wherein the polyalkylene ester comprises a polyisobutylene succinic ester.

~~14~~10. The anti-fouling composition of claim ~~13~~9, wherein the polyisobutylene succinic ester is derived from a reaction of polyisobutylene succinic anhydride and a polyol.

~~15~~11. The anti-fouling composition of claim ~~14~~10, wherein the polyol comprises pentaerythritol, triethanolamine, glycerol, glucose, sucrose, arabitol, erythritol, maltitol,

mannitol, ribitol, sorbitol, xylitol, threitol, galactitol, isomalt, iditol, lactitol, or a combination thereof.

~~16~~12. The anti-fouling composition of claim ~~14~~11, wherein the polyol comprises pentaerythritol.

~~17~~13. The anti-fouling composition of any one of claims 2 to ~~9~~12, comprising the polyalkylene imide or the amine-substituted polyalkylene imide, wherein the polyalkylene imide is a polyalkylene succinimide and the amine-substituted polyalkylene imide is an amine-substituted polyalkylene succinimide.

~~18~~14. The anti-fouling composition of claim ~~17~~13, wherein the polyalkylene succinimide is a polyethylene succinimide, a polyisopropylene succinimide, a polyisobutylene succinimide, or a combination thereof;~~.~~

~~19. The anti-fouling composition of claim 17, wherein~~and the amine-substituted polyalkylene succinimide is an amine-substituted polyethylene succinimide, an amine-substituted polyisopropylene succinimide, an amine-substituted polyisobutylene succinimide, or a combination thereof.

~~20. The anti-fouling composition of any one of claims 1 to 19, wherein the resin is present at a concentration from about 1 to about 99 wt.%, and the polyolefin is present at a concentration from about 1 to about 99 wt.%, based on the total weight of the resin and the polyolefin.~~

~~21~~15. The anti-fouling composition of any one of claims 1 to ~~19~~14, wherein the resin is present at a concentration from about 20 to about 80 wt.%, and the polyolefin is present at a concentration from about 20 to about 80 wt.%, based on the total weight of the resin and the polyolefin.

~~22. The anti-fouling composition of any one of claims 3 to 19, wherein the resin is present at a concentration from about 10 to about 80 wt.%, the polyolefin is present at a concentration from about 10 to about 80 wt.%, and the chelator is present at a concentration from about 1 to about 25 wt.%, based on the total weight of the resin, the polyolefin, and the chelator.~~

~~23. The anti-fouling composition of any one of claims 3 to 19, wherein the resin is present at a concentration from about 20 to about 70 wt.%, the polyolefin is present at a concentration from about 20 to about 70 wt.%, and the chelator is present at a concentration from about 5 to about 15 wt.%, based on the total weight of the resin, the polyolefin, and the chelator.~~

~~24~~16. A method for reducing or preventing fouling of a structural part in a petroleum-refining system exposed to a hydrocarbon fluid, comprising contacting the structural part with an effective amount of the anti-fouling composition of any one of claims 1 to ~~23~~15.

~~25. Use of the anti-fouling composition of any one of claims 1 to 23 for reducing or preventing fouling of a structural part in a petroleum-refining system exposed to a hydrocarbon fluid.~~

~~26~~17. The method ~~or use~~ of claim ~~24 or 25~~16, wherein the hydrocarbon fluid is a petrochemical fluid, and ~~.~~

~~27. The method or use of claim 26, wherein~~ the petrochemical fluid comprises an asphaltene, a paraffin, a wax, a scale, a naphthenate, coke, or a combination thereof.

~~28. The method or use of claim 26 or 27, wherein the anti-fouling composition is contacted with the petrochemical fluid in an effective amount to disperse a foulant precursor.~~

~~29. The method or use of any one of claims 26 to 28, wherein the anti-fouling composition is contacted with the petrochemical fluid in an effective amount to prevent or reduce deposition of a foulant.~~

~~30~~18. The method ~~or use~~ of claim ~~26 or 27~~17, wherein the anti-fouling composition is contacted with the petrochemical fluid in an effective amount to disperse asphaltene or to prevent or reduce deposition of coke.

~~31. The method or use of claim 26 or 27, wherein the anti-fouling composition is contacted with the structural part in an effective amount to prevent or reduce deposition of coke.~~

~~32~~19. The method ~~or use~~ of any one of claims ~~24~~ 16 to ~~31~~18, wherein the structural part comprises part of a production, a storage unit, a heat exchanger, a pipe, a pump, a flow meter, a valve, a desalter, a furnace, a coker, a distillation column, a fractionation column, an atmospheric column, a pipe still, a debutanizer, a reactor, a fluid catalytic cracking unit, a fluid catalytic cracking slurry settler, a hydrocracking unit, a steam cracking unit, a thermal cracking unit, a visbreaker, a reflex unit, a condenser, a scrubber, or a combination thereof; preferably, the structural part comprises part of a heat exchanger, a crude processing unit, a fluid catalytic cracking unit, a visbreaker, or a combination thereof.

~~33. The method or use of claim 32, wherein the structural part comprises part of a heat exchangers, a crude processing unit, a fluid catalytic cracking unit, a fluid catalytic cracking slurry settler, a hydrocracking unit, a steam cracking unit, a thermal cracking unit, a visbreaker, or a combination thereof.~~

~~34. The method or use of claim 33, wherein the structural part comprises part of a heat exchangers, a crude processing unit, a fluid catalytic cracking unit, a visbreaker, or a combination thereof.~~

~~35. The method or use of any one of claims 24 to 34, wherein the effective amount of the anti-fouling composition is from about 1 ppm to about 50,000 ppm based on the total amount of hydrocarbon fluid.~~

~~36~~20. The method ~~or use of claim 35~~of any one of claims 16 to 19, wherein the effective amount of the anti-fouling composition is from about 1 ppm to about 500 ppm.