CLAIMS

1. A tire composition comprising:

(I) a polymer;

(II) a nanocellulose dispersion composition (NDC) comprising:

(i) a partitioning agent comprising a carbon black filler, and at least one of an elastomer latex and/or a wax; and

(ii) a nanocellulose; and

(III) a carbon black additive;

wherein the tire composition is characterized by a dispersion index, determined by interferometric microscopy (IFM), of at least 90%; and

a weight ratio of the polymer to the nanocellulose dispersion composition (polymer:NDC) is in a range from 100:1 to 1:1.

2. A tire composition comprising:

(I) a polymer;

(II) a nanocellulose dispersion composition (NDC) comprising:

(i) a partitioning agent comprising a carbon black filler, and at least one of an elastomer latex and/or a wax; and

(ii) a nanocellulose; and

(III) a carbon black additive;

wherein the tire composition is characterized by a fatigue life at 100% tensile strain of at least 300,000 cycles; and

a weight ratio of the polymer to the nanocellulose dispersion composition (polymer:NDC) is in a range from 100:1 to 1:1.

3. The tire composition of claim 1 or 2, wherein a weight ratio of the polymer to the nanocellulose dispersion composition (polymer:NDC) is in a range from 80:1 to 10:1, from 75:1 to 2:1, from 60:1 to 5:1, from 50:1 to 1:1, from 40:1 to 4:1, from 75:1 to 25:1, from 90:1 to 15:1, from 75:1 to 1.5:1, or from 50:1 to 2:1.

4. The tire composition of any one of claims 1-3, wherein the polymer comprises an elastomer.

5. The tire composition of any one of claims 1-4, wherein the nanocellulose dispersion composition has greater nanocellulose dispersibility in the polymer composition than that of the nanocellulose without the partitioning agent.

6. The tire composition of any one of claims 1-5, wherein the nanocellulose comprises nanocellulose crystals (NC), nanocellulose fibrils (NF), or a combination thereof.

7. The tire composition of any one of claims 1-6, wherein the nanocellulose comprises lignin-coated nanocellulose crystals (LCNC), lignin-coated nanocellulose fibrils (LCNF), or a combination thereof.

8. The tire composition of any one of claims 1-7, wherein the nanocellulose comprises hydrophilic cellulose nanocellulose crystals (CNC), hydrophilic cellulose nanocellulose fibrils (CNF), or a combination thereof.

9. The tire composition of any one of claims 1-8, wherein the nanocellulose dispersion composition (NDC) further comprises a hydrocarbon oil.

10. The tire composition of any one of claims 1-9, wherein the polymer comprises a natural rubber (NR), an isoprene rubber (IR), a polybutadiene rubber (BR), an emulsion styrene-butadiene rubber (ESBR), or any combination thereof.

11. The tire composition of any one of claims 1-10, wherein the partitioning agent comprises the wax, and the wax comprises a non-branched alkane paraffin wax; a natural mineral, petroleum refined, or lignin refined branched paraffin wax or ceresine wax; a polyethylene wax; a functionalized polyethylene wax; or any combination thereof.

12. The tire composition of any one of claims 1-11, wherein the carbon black filler and the carbon black additive independently comprise a furnace carbon black and/or a surface-modified furnace carbon black.

13. The tire composition of any one of claims 1-12, wherein the carbon black filler and the carbon black additive are independently characterized by:

a nitrogen surface area of from 90 m^2/g to 140 m^2/g;

an external surface area of from 80 m^2/g to 125 m^2/g;

a pH of from 2.5 to 9;

a 50 GM void volume of from 55 $cm^3/100g$ to 67 $cm^3/100g$;

a 75 GM void volume of from 50 $cm^3/100g$ to 60 $cm^3/100g$;

a 100 GM void volume of from 45 $cm^3/100g$ to 55 $cm^3/100g$;

a moisture content of from 2.5 wt. % to 4.5 wt. %;

a volatile content of from 4.5 wt. % to 6.5 wt. %;

an oxygen content of from 2.5 wt. % to 5.5 wt. %; or

any combination thereof.

14. The tire composition of any one of claims 1-13, wherein the partitioning agent comprises the carbon black filler, the elastomer latex, and the wax.

15. The tire composition of any one of claims 1-14, wherein a weight ratio of the partitioning agent to the nanocellulose is in a range from 0.1:1 to 25:1, from 0.1:1 to 10:1, from 0.1:1 to 5:1, from 0.1:1 to 1:1, from 0.25:1 to 15:1, from 0.3:1 to 10:1, from 0.5:1 to 25:1, from 0.75:1 to 15:1, or from 1:1 to 10:1.

16. The tire composition of any one of claims 1-15, wherein the nanocellulose dispersion composition (NDC) is produced by process comprising:

(a) combining an aqueous dispersion of the nanocellulose with the partitioning agent to form a mixture; and

(b) drying the mixture to form the nanocellulose dispersion composition (NDC).

17. The tire composition of any one of claims 1-15, wherein the nanocellulose dispersion composition (NDC) is produced by process comprising:

(A) combining an aqueous dispersion of the nanocellulose with the partitioning agent to form a mixture; and

(B) drying the mixture to form the nanocellulose dispersion composition (NDC);

wherein the partitioning agent is stable in the NDC and is spaced between nanocellulose particles to reduce or prevent agglomeration of the nanocellulose particles in the NDC.

18. The tire composition of any one of claims 1-17, wherein the tire composition contains:

from 20 to 150 phr of carbon black, from 1 to 15 phr of nanocellulose, and from 1 to 15 phr of hydrocarbon oil; or

from 30 to 100 phr of carbon black, from 2 to 10 phr of nanocellulose, and from 2 to 10 phr of hydrocarbon oil; or

from 40 to 80 phr of carbon black, from 2 to 7.5 phr of nanocellulose, and from 3 to 9 phr of hydrocarbon oil.

19. The tire composition of any one of claims 1-18, wherein the tire composition is characterized by a dispersion index, determined by interferometric microscopy (IFM), of at least 92%, at least 93%, at least 94%, at least 95%, at least 96%, at least 97%, or at least 98%.

20. The tire composition of any one of claims 1-19, wherein the tire composition is characterized by an area fraction of undispersed material, determined by interferometric microscopy (IFM), of less than or equal to 8%, less than or equal to 6%, less than or equal to 4%, less than or equal to 3%, or less than or equal to 2%.

21. The tire composition of any one of claims 1-20, wherein the tire composition is characterized by a fatigue life at 100% tensile strain of at least 325,000 cycles, at least 350,000 cycles, at least 375,000 cycles, or at least 400,000 cycles.

22. An article of manufacture comprising the tire composition of any one of claims 1-21.

23. The article of claim 22, wherein the article is a pneumatic tire, a passenger car tire, or a truck and bus radial tire.

24. The article of claim 22, wherein the article is a tire tread.