Claims

1. A modified rubber masterbatch, comprising an uncrosslinked rubber and rubber particles having crosslinked structure dispersed therein, wherein the rubber particles having crosslinked structure are synthetic rubber particles and/or natural rubber particles with an average particle size of 20 to 500 nm, preferably 50 to 200 nm, more preferably 70 to 200 nm, and a gel content of 60% by weight or higher, preferably 75% by weight or higher, and the uncrosslinked rubber is a styrene-butadiene rubber; and wherein the weight ratio of the rubber particles having crosslinked structure to the uncrosslinked rubber is greater than 20:80 and less than or equal to 80:20.

2. The modified rubber masterbatch according to claim 1, characterized in that the rubber particles having crosslinked structure are one or more selected from the group consisting of natural rubber particles, styrene-butadiene rubber particles, carboxylated styrene-butadiene rubber particles, nitrile butadiene rubber particles, carboxylated nitrile butadiene rubber particles, chloroprene rubber particles, polybutadiene rubber particles, silicone rubber particles, acrylic rubber particles, styrene-butadiene-vinylpyridine rubber particles; preferably one or more selected from the group consisting of nitrile butadiene rubber particles, styrene-butadiene-vinylpyridine rubber particles, styrene-butadiene rubber particles, carboxylated styrene-butadiene rubber particles; more preferably one or more selected from the group consisting of styrene-butadiene-vinylpyridine rubber particles, nitrile butadiene rubber particles; most preferably nitrile butadiene rubber particles.

3. The modified rubber masterbatch according to claim 1 or 2, characterized in that the rubber particles having crosslinked structure are of homogeneous structure.

4. The modified rubber masterbatch according to any one of claims 1 to 3, characterized in that the weight ratio of the rubber particles having crosslinked structure to the uncrosslinked rubber is 30:70-80:20; preferably 40:60-80:20.

5. The modified rubber masterbatch according to any one of claims 1 to 4, characterized in that the modified rubber masterbatch is obtained by mixing the components comprising the uncrosslinked rubber latex and a latex of the rubber particles having crosslinked structure till homogeneous and then coagulating them, wherein the latex

of the rubber particles having crosslinked structure is a rubber latex obtained by radiation crosslinking.

6. A preparation process for the modified rubber masterbatch according to any one of claims 1 to 5, comprising the following steps:

(1) subjecting a latex of synthetic rubber and/or natural rubber to the radiation crosslinking and thereby providing the synthetic rubber and/or natural rubber particles in the latex with a crosslinked structure, the said gel content and meanwhile an average particle size fixed in the said average particle size range;

(2) mixing till homogeneous the above radiation crosslinked latex of the synthetic rubber and/or natural rubber with a latex of the uncrosslinked rubber according to the said weight ratio of the rubber particles having crosslinked structure to the uncrosslinked rubber;

(3) coagulating the above mixed latices to obtain the said modified rubber masterbatch.

7. The preparation process according to claim 6, characterized in that the latex of synthetic rubber and/or natural rubber latex is one or more selected from the group consisting of natural rubber latex, styrene-butadiene rubber latex, carboxylated styrene-butadiene rubber latex, nitrile butadiene rubber latex, carboxylated nitrile butadiene rubber latex, chloroprene rubber latex, polybutadiene rubber latex, silicone rubber latex or acrylic rubber latex, styrene-butadiene-vinylpyridine rubber latex and the like; preferably one or more selected from the group consisting of nitrile butadiene rubber latex, styrene-butadiene-vinylpyridine rubber latex, styrene-butadiene rubber latex, carboxylated styrene-butadiene rubber latex; more preferably one or more selected from the group consisting of styrene-butadiene-vinylpyridine rubber latex, nitrile butadiene rubber latex; most preferably nitrile butadiene rubber latex.

8. A rubber composition, comprising a blend of the modified rubber masterbatch according to any one of claims 1 to 5 and a base rubber, wherein the modified rubber masterbatch is present in an amount of 1 to 70 parts by weight, preferably 1 to 40 parts by weight and more preferably 1 to 30 parts by weight, relative to per 100 parts by weight of the base rubber.

9. The rubber composition according to claim 8, characterized in that the base rubber is one or more selected from the group consisting of natural rubber, modified natural rubber,

synthetic rubber; such as one or more selected from the group consisting of natural rubber, solution polymerized styrene-butadiene rubber or its oil extended products, a emulsion polymerized styrene-butadiene rubber or its oil extended products and polybutadiene rubber or its oil extended products; preferably any one or more selected from the group consisting of solution polymerized styrene-butadiene rubber or its oil extended products, emulsion polymerized styrene-butadiene rubber or its oil extended products and polybutadiene rubber or its oil extended products.

10. A preparation process for the rubber composition according to claim 8 or 9, comprising a step of compounding the modified rubber masterbatch and the base rubber in the said amounts to obtain a rubber composition.

11. The preparation process according to claim 10, characterized in that the preparation process for the modified rubber masterbatch comprising the following steps:

(1) subjecting a latex of synthetic rubber and/or natural rubber to the radiation crosslinking and thereby providing the synthetic rubber and/or natural rubber particles in the latex with a crosslinked structure, the said gel content and meanwhile an average particle size fixed in the said average particle size range;

(2) mixing till homogeneous the above radiation crosslinked latex of the synthetic rubber and/or natural rubber with a latex of the uncrosslinked rubber according to the said weight ratio of the rubber particles having crosslinked structure to the uncrosslinked rubber;

(3) coagulating the above mixed latices to obtain the said modified rubber masterbatch.

12. A vulcanized rubber produced from the rubber composition according to claim 8 or 9.

CLAIMS

1. A modified rubber masterbatch, consisting of an uncrosslinked rubber and rubber particles having a radiation crosslinked structure dispersed therein, wherein the rubber particles having the radiation crosslinked structure are synthetic rubber particles and/or natural rubber particles with an average particle size of 20 to 500 nm, and a gel content of 60% by weight or higher, and the uncrosslinked rubber is a styrene-butadiene rubber; and wherein the weight ratio of the rubber particles having the radiation crosslinked structure to the uncrosslinked rubber is greater than 20:80 and less than or equal to 80:20.

2. The masterbatch according to claim 1, characterized in that the rubber particles having the radiation crosslinked structure are one or more selected from the group consisting of natural rubber particles, styrene-butadiene rubber particles, carboxylated styrene-butadiene rubber particles, nitrile butadiene rubber particles, carboxylated nitrile butadiene rubber particles, chloroprene rubber particles, polybutadiene rubber particles, silicone rubber particles, acrylic rubber particles, and styrene-butadiene-vinylpyridine rubber particles.

3. The masterbatch according to claim 1 or claim 2, characterized in that the rubber particles having the radiation crosslinked structure are of homogeneous structure.

4. The masterbatch according to any one of claims 1 to 3, characterized in that the weight ratio of the rubber particles having the radiation crosslinked structure to the uncrosslinked rubber is 30:70-80:20.

5. The masterbatch according to any one of claims 1 to 4, characterized in that the modified rubber masterbatch is obtained by mixing the components comprising the uncrosslinked rubber latex and a latex of the rubber particles having the radiation crosslinked structure until they are homogeneous and then coagulating them.

6. A process for preparing the modified rubber masterbatch according to any one of claims 1 to 5, comprising the following steps:

(1) subjecting a latex of synthetic rubber and/or natural rubber to the radiation crosslinking and thereby providing the synthetic rubber and/or natural rubber particles in the latex with a cross-linked structure, the gel content of 60% by weight or higher and meanwhile an average particle size fixed in the range of 20 to 500nm;

(2) mixing the above radiation crosslinked latex of the synthetic rubber and/or natural rubber with a latex of the uncrosslinked rubber until homogenous according to a specified weight ratio of the rubber particles having the radiation crosslinked structure to the uncrosslinked rubber; and

(3) coagulating the above mixed latices to obtain the modified rubber masterbatch.

7. The process according to claim 6, characterized in that the latex of synthetic rubber and/or natural rubber latex is one or more selected from the group consisting of natural rubber latex, styrene-butadiene rubber latex, carboxylated styrene-butadiene rubber latex, nitrile butadiene rubber latex, carboxylated nitrile butadiene rubber latex, chloroprene rubber latex, polybutadiene rubber latex, silicone rubber latex, acrylic rubber latex, and styrene-butadiene-vinylpyridine rubber latex.

8. A rubber composition, comprising a blend of the modified rubber masterbatch according to any one of claims 1 to 5, and a base rubber, wherein the modified rubber masterbatch is present in an amount of 1 to 70 parts by weight, relative to 100 parts by weight of the base rubber.

9. The composition according to claim 8, characterized in that the base rubber is one or more selected from the group consisting of natural rubber, modified natural rubber, synthetic rubber and its oil extended products.

10. A process for preparing the rubber composition according to claim 8 or claim 9, comprising a step of compounding the modified rubber masterbatch and the base rubber in the amounts to obtain a rubber composition.

11. The process according to claim 10, characterized in that the process comprises the following steps:

(1) subjecting a latex of synthetic rubber and/or natural rubber to the radiation crosslinking and thereby providing the synthetic rubber and/or natural rubber particles in the latex with a crosslinked structure, the gel content of 60% by weight or higher and meanwhile an average particle size fixed in the range of 20 to 500nm;

(2) mixing the above radiation crosslinked latex of the synthetic rubber and/or natural rubber with a latex of the uncrosslinked rubber until homogenous according to a specified weight ratio of the rubber particles having the radiation crosslinked structure to the uncrosslinked rubber; and

(3) coagulating the above mixed latices to obtain the modified rubber masterbatch.

12. A vulcanized rubber produced from the rubber composition according to claim 8.

13. The masterbatch according to claim 1, wherein the rubber particles having radiation crosslinked structure are synthetic rubber particles and/or natural rubber particles with an average particle size of 50 to 200 nm.

14. The masterbatch according to claim 13, wherein the rubber particles having radiation cross-linked structure are synthetic rubber particles and/or natural rubber particles with an average particle size of 70 to 200 nm.

15. The masterbatch according to claim 1, wherein the rubber particles having radiation crosslinked structure are synthetic rubber particles and/or natural rubber particles with a gel content of 75% by weight or higher.

16. The masterbatch according to claim 1, characterized in that the rubber particles having radiation crosslinked structure are one or more selected from the group consisting of nitrite butadiene rubber particles, styrene-butadiene-vinylpyridine rubber particles, styrene-butadiene rubber particles, and carboxylated styrene-butadiene rubber particles.

17. The masterbatch according to claim 1, characterized in that the rubber particles having radiation cross-linked structure are one or more selected from the group consisting of styrene-butadiene-vinylpyridine rubber particles and nitrile butadiene rubber particles.

18. The masterbatch according to claim 1, characterized in that the rubber particles having radiation cross-linked structure nitrile butadiene rubber particles.

19. The masterbatch according to claim 1, characterized in that the weight ratio of the rubber particles having radiation crosslinked structure to the uncrosslinked rubber is 40:60-80:20.

20. The process according to claim 6, characterized in that the latex of synthetic rubber and/or natural rubber latex is one or more selected from the group consisting of nitrile butadiene rubber latex, styrene-butadiene-vinylpyridine rubber latex, styrene-butadiene rubber latex, and carboxylated styrene-butadiene rubber latex.

21. The process according to claim 20, characterized in that the latex of synthetic rubber and/or

natural rubber latex is one or more selected from the group consisting of styrene-butadiene-vinylpyridine rubber latex and nitrile butadiene rubber latex.

22. The process according to claim 21, characterized in that the latex of synthetic rubber and/or natural rubber latex is nitrile butadiene rubber latex.

23. The composition of claim 8, wherein the modified rubber masterbatch is present in an amount of 1 to 40 parts by weight relative to 100 parts by weight of the base rubber.

24. The composition of claim 23, wherein the modified rubber masterbatch is present in an amount of 1 to 30 parts by weight relative to 100 parts by weight of the base rubber.

25. The composition of claim 8, characterized in that the base rubber is one or more selected from the group consisting of natural rubber, solution polymerized styrene-butadiene rubber, emulsion polymerized styrene-butadiene rubber and polybutadiene rubber.

26. The composition of claim 25, characterized in that the base rubber is one or more selected from the group consisting of solution polymerized styrene-butadiene rubber, emulsion polymerized styrene-butadiene rubber and polybutadiene rubber.