CLAIMS

1. A method of preparing a packaging material according to any one of claims 1 to 14, the method comprising

a) providing a natural antimicrobial agent, and

b) dispersing the natural antimicrobial agent in a degradable polymer to obtain the packaging material;

wherein providing the natural antimicrobial agent comprises:

dissolving the natural antimicrobial agent and the natural bioactive agent in an aqueous solution to form an aqueous mixture, and

drying the aqueous mixture to obtain the natural antimicrobial agent;

and wherein dispersing the natural antimicrobial agent in a degradable polymer comprises:

melting the degradable polymer;

mixing the natural antimicrobial agent with the molten degradable polymer to form a polymeric mixture; and

heat pressing the polymeric mixture;

wherein melting the degradable polymer is carried out at a temperature above melting point of the degradable polymer using a two-roll milling process; and

wherein mixing the natural antimicrobial agent with the molten degradable polymer comprises sieving the natural antimicrobial agent onto the molten degradable polymer while the two-roll milling process is carried out.

2. The method according to claim 1, wherein the natural antimicrobial agent further comprises a natural bioactive agent.

3. The method according to claims 1 or 2, wherein dissolving the natural antimicrobial agent and the natural bioactive agent in an aqueous solution is carried out at ambient conditions.

4. The method according to any one of the preceding claims, wherein dissolving the natural antimicrobial agent and the natural bioactive agent in an aqueous solution is carried

out with ratio of the natural bioactive agent to the natural antimicrobial agent in the range of about 1:1 to about 3:1 ml/g.

5. The method according to any one of the preceding claims, wherein drying the aqueous mixture is carried by a two-step procedure of freeze drying and vacuum drying.

6. The method according to claim 5, wherein freeze drying is carried out for a time period in the range of about 1 hour to about 3 hours.

7. The method according to claim 5 or 6, wherein vacuum drying is carried out for a time period in the range of about 1 day to about 3 days.

8. The method according to any one of the preceding claims, wherein the natural antimicrobial agent comprises particles having a size of 75 µm or less.

9. The method according to any one of the preceding claims, wherein heat pressing the polymeric mixture is carried out at a pressure in the range of about 20 MPa to about 40 MPa.

10. A packaging material prepared using the method of any one of the preceding claims, comprising the degradable polymer and the natural antimicrobial agent, wherein the degradable polymer forms a polymeric matrix within which the natural antimicrobial agent is dispersed.

11. The packaging material according to claim 10, wherein the natural antimicrobial agent is selected from the group consisting of chitosan, chitin, lignin, derivatives thereof, combinations thereof, and copolymers thereof.

12. The packaging material according to claims 10 or 11, wherein the natural antimicrobial agent comprises chitosan.

13. The packaging material according to any one of claims 10 to 12, wherein the natural antimicrobial agent further comprises a natural bioactive agent.

14. The packaging material according to claim 13, wherein the natural bioactive agent is selected from the group consisting of grapefruit seed extract, olive leaf extract, natamycin, chinokitiol, lysozyme, bacteriocins, essential oils, tea tree oil, lemon peel, pomelo, cinnamon, and combinations thereof.

15. The packaging material according to claim 13 or 14, wherein the natural bioactive agent comprises grapefruit seed extract.

16. The packaging material according to any one of claims 13 to 15, wherein ratio of the natural bioactive agent to the natural antimicrobial agent is in the range of about 1:1 to about 3:1 ml/g.

17. The packaging material according to any one of claims 10 to 16, wherein the natural antimicrobial agent comprises particles having a size of 75 μm or less.

18. The packaging material according to any one of claims 10 to 17, wherein amount of the natural antimicrobial agent in the polymeric matrix is in the range of about 0.01 wt% to about 40 wt%.

19. The packaging material according to any one of claims 10 to 18, wherein amount of the natural antimicrobial agent in the polymeric matrix is in the range of about 0.01 wt% to about 15 wt %.

20. The packaging material according to any one of claims 10 to 19, wherein the degradable polymer is selected from the group consisting of poly(ε-caprolactone), aliphatic polyester, polylactide, poly(glycolide), poly(hydroxy ester ether), poly(hydroxybutyrate), poly(anhydride), polycarbonate, poly(amino acid), poly(ethylene oxide), poly(phosphazene), polyether ester, polyester amide, polyamide, combinations thereof, and copolymers thereof.

21. The packaging material according to any one of claims 10 to 20, wherein the degradable polymer comprises poly(ε-caprolactone).

22. The packaging material according to any one of claims 10 to 21, wherein the natural antimicrobial agent is at least substantially uniformly dispersed in the polymeric matrix.

23. The packaging material according to any one of claims 10 to 22, wherein the packaging material is a food packaging film.

24. Use of a packaging material prepared by a method according to any one of claims 1 to 9 in food packaging.