# FOOD PRODUCT COATINGS

## CROSS REFERENCE TO RELATED APPLICATION

**[0001]** This application claims the benefit of the earlier filing date of U.S. Provisional Patent Application No. 62/452,897, filed on January 31, 2017, which is incorporated herein by reference in its entirety.

## FIELD

**[0002]** Disclosed herein are embodiments of coating compositions and films for foodstuffs and methods of making and using the same.

## BACKGROUND

**[0003]** Cavendish banana (Musa acuminate) is a rich source of vitamins and bioactive compounds (e.g. dietary fiber and phenolic compounds), and one of mostly consumed fruit worldwide. As a climacteric fruit, however, bananas have a relatively short shelf-life, regarding physiological disorder, postharvest diseases, and senescence. Bananas are just one example of foods that typically require an external modification to preserve shelf-life of the food. There remains a need in the art for improved compositions and coatings that can improve self-life and/or pre-harvest integrity of various food items, such as perishable foods, plants and plant parts.

## SUMMARY

**[0004]** Disclosed herein are examples of a coating composition, comprising a cellulose nanomaterial and an emulsion system, comprising a hydrophobic agent (e.g., a fatty acid) and a surfactant. The coating compositions can further comprise a functional agent, a plasticizer, or any combination thereof. In some examples, the cellulose nanomaterial can comprise cellulose nanocrystals or cellulose nanofibrils. In one aspect, the present disclosure refers to a coating composition, comprising: a cellulose nanomaterial in an amount ranging from 0.1% w/w wet basis to 1% w/w wet basis; and an emulsion system, comprising an oleic acid and a sucrose ester of a fatty acid, wherein the oleic acid is present in an amount ranging from 0.1% w/w wet basis to 5% w/w wet basis and the sucrose ester of a fatty acid is present in an amount ranging from 0.1% w/w wet basis to 2% w/w wet basis; wherein the cellulose nanomaterial comprises cellulose nanofibrils.

**[0005]** Also disclosed herein are examples of a dried (or substantially dried) coating comprising a cellulose nanomaterial and an emulsion system, comprising a hydrophobic agent and a surfactant and substantially free of moisture. In some examples, the coating composition or the dried (or substantially) dried coating can be used to coat a foodstuff, such as a plant or plant part. In one aspect, the present disclosure refers to a dried coating formed from the coating composition disclosed herein, wherein the dried coating comprises greater than 0% w/w to 10% w/w moisture.

**[0006]** Also disclosed herein are examples of a method, comprising coating or substantially coating a plant or plant part with a coating composition example described herein. In one aspect, the present disclosure refers to a method, comprising partially or wholly coating a plant or a plant part with a coating composition disclosed herein. In one aspect, the present disclosure refers to a plant part, comprising a coating formed from the coating composition disclosed herein or comprising the dried coating disclosed herein.

**[0007]** The foregoing and other objects, features, and advantages of the present disclosure will become more apparent from the following detailed description, which proceeds with reference to the accompanying figures.

We claim:

1. A coating composition, comprising:

a cellulose nanomaterial in an amount ranging from 0.1% w/w wet basis to 1% w/w wet basis; and

an emulsion system, comprising an oleic acid and a sucrose ester of a fatty acid, wherein the oleic acid is present in an amount ranging from 0.1% w/w wet basis to 5% w/w wet basis and the sucrose ester of a fatty acid is present in an amount ranging from 0.1% w/w wet basis to 2% w/w wet basis;

wherein the cellulose nanomaterial comprises cellulose nanofibrils.

2. A dried coating formed from the coating composition of claim 1, wherein the dried coating comprises greater than 0% w/w to 10% w/w moisture.

3. The dried coating of claim 2, wherein

(i) the oleic acid is present in an amount ranging from 9.5% w/w dry basis to 23% w/w dry basis; or

(ii) the sucrose ester of a fatty acid component is present in an amount ranging from 9.5% w/w dry basis to 9.8% w/w dry basis.

4. A plant part, comprising a coating formed from the coating composition of claim 1 or comprising the dried coating of claim 2 or claim 3.

5. The plant part of claim 4, wherein the plant part is a banana, a papaya, an avocado, a melon, or a mango.

6. A method, comprising partially or wholly coating a plant or a plant part with a coating composition according to claim 1.