CLAIMS

1. A composite coating material for passive vibration damping, comprising:

a polymer matrix;

a piezoelectric ceramic filler dispersed in the polymer matrix, wherein particles of the piezoelectric ceramic filler have an average particle size of greater than 400 microns (μm); and

an electrically conductive filler dispersed in the polymer matrix.

2. The composite coating material according to claim 1, wherein the average particle size of the particles of the piezoelectric ceramic filler is between 400 μm and 1000 μm.

3. The composite coating material according to claim 1 or 2, further comprising between 20 percent by mass (wt%) and 60 wt% of the piezoelectric ceramic filler.

4. The composite coating material according to any one of the preceding claims, wherein the piezoelectric ceramic filler comprises a lead-free material.

5. The composite coating material according to claim 4, wherein the piezoelectric ceramic filler comprises a potassium-sodium niobate (KNN)-based ceramic powder.

6. The composite coating material according to any one of the preceding claims, further comprising between 35 wt% and 79.5 wt% of the polymer matrix.

7. The composite coating material according to any one of the preceding claims, wherein the polymer matrix comprises a polymer selected from a group consisting of epoxy, polyvinyl butyral (PVB), acrylic rubber and ethylene-vinyl acetate (EVA).

8. The composite coating material according to any one of the preceding claims, further comprising between 0.5 wt% and 4 wt% of the electrically conductive filler.

9. The composite coating material according to any one of the preceding claims, wherein the electrically conductive filler comprises carbon nanotubes.

10. The composite coating material according to claim 9, wherein the carbon nanotubes have an outer diameter of between 8 nanometres (nm) and 15 nm.

11. The composite coating material according to claim 9 or 10, wherein the carbon nanotubes have a length of between 10 μm and 30 μm.

12. The composite coating material according to claim 1, comprising:

40 wt% of the polymer matrix, wherein the polymer matrix comprises epoxy;

58 wt% of the piezoelectric ceramic filler, wherein the piezoelectric ceramic filler comprises KNN-based ceramic; and

2 wt% of the electrically conductive filler, wherein the electrically conductive filler comprises carbon nanotubes.

13. The composite coating material according to claim 1, comprising:

between 78 wt% and 79 wt% of the polymer matrix, wherein the polymer matrix comprises polyvinyl butyral (PVB);

20 wt% of the piezoelectric ceramic filler, wherein the piezoelectric ceramic filler comprises KNN-based ceramic; and

between 1 wt% and 2 wt% of the electrically conductive filler, wherein the electrically conductive filler comprises carbon nanotubes.

14. The composite coating material according to claim 1, comprising:

78.6 wt% of the polymer matrix, wherein the polymer matrix comprises ethylene-vinyl acetate (EVA);

20 wt% of the piezoelectric ceramic filler, wherein the piezoelectric ceramic filler comprises KNN-based ceramic; and

1.4 wt% of the electrically conductive filler, wherein the electrically conductive filler comprises carbon nanotubes.

15. The composite coating material according to claim 1, comprising:

71 wt% of the polymer matrix, wherein the polymer matrix comprises acrylic rubber;

28 wt% of the piezoelectric ceramic filler, wherein the piezoelectric ceramic filler comprises KNN-based ceramic; and

1 wt% of the electrically conductive filler, wherein the electrically conductive filler comprises carbon nanotubes.