markings. More specifically, the inventors of the present disclosure recognized that by including core-shell particles in thermoplastic road markings including ethylene vinyl acetate and/or ethylene acrylic acid, the cold weather crack-resistance of the road markings can be improved. The inventors of the present disclosure also determined the most desirable and beneficial weight percentages of the core-shell particles and of the ethylene vinyl acetate and/or ethylene acrylic acid copolymers.

[0006] Some embodiments of the present disclosure relate to a thermoplastic road marking composition, comprising: ethylene vinyl acetate and/or ethylene acrylic acid copolymers in an amount of between about 1.5 wt% to about 6.0 wt%; and core-shell particles in an amount of between about 0.5 wt% and about 3.0 wt%. In some embodiments, the core-shell particles are selected from a group consisting essentially of acrylics, MBS, and/or MABS copolymers. In some embodiments, the ethylene vinyl acetate and/or ethylene acrylic acid copolymers have a melt flow index of between 2 g/10 min and 400 g/10 min.

[0006a] An aspect of the present disclosure provides a thermoplastic road marking composition, comprising: at least one of an ethylene vinyl acetate copolymer and/or an ethylene acrylic acid copolymer having a melt flow index equal to or less than 45 g/ 10 min at 190° C in an amount of between about 2.5 wt% to about 4.5 wt%; and core-shell particles in an amount of between about 0.5 wt% and about 2.5 wt%.

[0007] Some embodiments are road or pavement markers. Some embodiments are a road marker having a crack-resistance that passes the cold impact test provided in 4.2.1.4 (using the process described in Annex H) of the National Standards Authority of Ireland Irish Standard No. I.S. EN 1871:2000 (copyright 2000). Some embodiments are road markers that, when ten road markers are tested, six of the tested road markers do not crack when a 110,0 g (+/- 0.3 g and approximately a 30.0 mm diameter) steel ball is dropped on the road marker from a height of 2,00 m in conditions of a temperature of -10°C (+/- 3°C) using the method of testing described in the National Standards Authority of Ireland Irish Standard No. I.S. EN 1871:2000 (copyright 2000) Section 4.2.1.4 (using the testing method described in Annex H). Some embodiments are road makers having an indentation time of greater than 20 minutes when tested according to the National Standards Authority of Ireland Irish Standard No. I.S. EN 1871:2000 (copyright 2000) Section 4.2.3.3 (using the testing method described in Annex J). Some embodiments are road markers having a percent residue flow of between about 3.0% and about 15%.

Detailed Description

[0008] Some embodiments of the present disclosure relate to a thermoplastic road marking composition, comprising: ethylene vinyl acetate ("EVA") and/or ethylene acrylic acid ("EAA") copolymers in an

amount of between about 1.5 wt% and about 6.0 wt%; and core-shell particles in an amount of between about 0.5 wt% and about 3.0 wt%.

[0009] Some exemplary commercially available EVA copolymers include, for example, Elvax™ 150, Elvax 250, Elvax 260, Elvax 350, Elvax 410, Elvax 450, Elvax 550, Ateva™ 1241, Ateva 1615, Ateva 1641, Ateva 9020, Ateva 9030, Evatane™ 20-20, Evatane 28-25, Evatane 28-40, Evatane 33-25, Evatane 33-45, Evatane 40-55, Escorene Ultra™ FL 01418, Escorene Ultra UL 02518CC, and Escorene Ultra UL 05540EH2. Some EVA copolymers capable of use in the retroreflective articles described and claimed herein have a melt flow index of between 2 g/10 min and 400 g/10 min.