CLAIMS

1. A safety coating, wherein raw materials of the safety coating comprise an inorganic filler and a first binder;

a coefficient of nonuniformity C_u of the inorganic filler satisfies $2 \leq C_u \leq 18$, a curvature coefficient C_c of the inorganic filler satisfies $0.5 \leq C_c \leq 3.1$;

a mass fraction w of the first binder in the safety coating satisfies $w = k \times (C_u)^{0.5}/D_{v50}$, where $0.2 \leq k \leq 2$, and k is a constant, and a mass fraction of the first binder in the safety coating is 1 wt% to 21.2 wt%;

a formula for calculating the coefficient of nonuniformity C_u is as follows: $C_u = D_{v90}/D_{v10}$, and a formula for calculating the curvature coefficient C_c is as follows: $C_c = D_{v50} \times D_{v50}/(D_{v10} \times D_{v90})$; and

D_{v10}, D_{v50}, and D_{v90} refer to particle sizes corresponding to volume distribution cumulative values of the inorganic filler reaching 10%, 50%, and 90%, respectively.

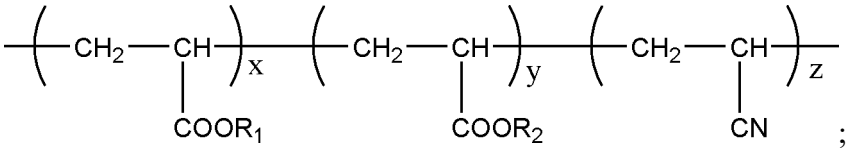
2. The safety coating according to claim 1, wherein a median particle size D_{v50} of the inorganic filler ranges from 0.2 μm to 4 μm, and a specific surface area is 5-50 m^2/g; and/or

the inorganic filler comprises one or more of aluminum oxide, boehmite, aluminum hydroxide, magnesium hydroxide, silicon dioxide, titanium dioxide, lithium iron phosphate, lithium manganese iron phosphate, lithium aluminum titanium phosphate, lithium lanthanum titanate, or lithium lanthanum zirconium oxide; and/or

a mass fraction of the inorganic filler in the safety coating is 73.8% to 98.5%.

3. The safety coating according to claim 1, wherein the first binder comprises one or more of a polyvinylidene fluoride binder, a sodium carboxymethyl cellulose binder, or a polyacrylate-based binder.

4. The safety coating according to claim 3, wherein the first binder is a polyacrylate-based binder, and a structural formula of the polyacrylate-based binder is as follows:



;

wherein, R_1 is H, Li, or Na;

R_2 is substituted or unsubstituted C_1-C_{10} alkyl;

$5 \leq (x+z)/y \leq 20$, $1.2 \leq z/x \leq 2$, where x, y, and z are all non-zero; and/or

a weight-average molecular weight M_w of the polyacrylate-based binder ranges from 200,000 to

500,000, a number-average molecular weight M_n of the polyacrylate-based binder ranges from 100,000 to 400,000; and/or

a ratio of the weight-average molecular weight M_w to the number-average molecular weight M_n of the polyacrylate-based binder is $M_w/M_n \leq 3$; and/or

an electrolytic solution absorption rate c of the polyacrylate-based binder at 80 °C is 10% to 50%.

5. The safety coating according to any one of claims 1-4, wherein the raw materials of the safety coating further comprise a first conductive agent, and the safety coating satisfies at least one of the following:

A1) a mass fraction of the first conductive agent in the safety coating is 0.5% to 5%;

A2) a mass ratio of the first conductive agent, the first binder, and the inorganic filler is 0.5-5: 1-21.2: 73.8-98.5;

A3) the raw materials of the safety coating further comprise a thermally stable active material;

A4) when A3) is included, a mass ratio of the first conductive agent, the first binder, the inorganic filler, and the thermally stable active material is 0.5-5: 1-21.2: 1-97.5: 1-97.5; and

A5) when A3) is included, the thermally stable active material comprises one or both of lithium iron phosphate and lithium manganese iron phosphate.

6. An electrode sheet, comprising:

a current collector;

an active material layer; and

the safety coating according to any one of claims 1-5.

7. The electrode sheet according to claim 6, wherein the safety coating is coated on at least one side surface of the current collector, and the active material layer is coated on one side surface of the safety coating facing away from the current collector and/or on one side surface of the current collector facing away from the safety coating; or

the active material layer is coated on at least one side surface of the current collector, and the safety coating is coated on one side surface of the active material layer facing away from the current collector and/or on one side surface of the current collector facing away from the active material layer.

8. The electrode sheet according to claim 7, wherein the safety coating is coated on both side surfaces of the current collector, and the safety coating satisfies at least one of the following conditions:

B1) a double-sided thickness of the safety coating is 1 μm to 20 μm;

B2) a double-sided coating areal density of the safety coating is 2 mg/1540.25 mm^2 to 35 mg/1540.25 mm^2;

B3) a double-sided film resistance of the safety coating tested under a pressure of 0.4 t is 0.5 Ωto 5 Ω;

B4) numerical values of the double-sided thickness d and the double-sided film resistance R under a pressure of 0.4 t of the safety coating satisfy: $2 \leq R \times d \leq 50$; and

B5) along a direction perpendicular to an unwinding direction of the current collector, a distance W_{A1} between a left edge of the safety coating on Side A of the current collector and a left edge of the current collector ranges from 2 mm to 30 mm, and a distance W_{A2} between a right edge of the safety coating on Side A of the current collector and a right edge of the current collector ranges from 3 mm to 30 mm; a distance W_{B1} between a left edge of the safety coating on Side B of the current collector and a left edge of the current collector ranges from 2 mm to 30 mm, and a distance W_{B2} between a right edge of the safety coating on Side B of the current collector and a right edge of the current collector ranges from 3 mm to 30 mm; where W_{B1}-$W_{A1} \geq 1$ mm and W_{B2}-$W_{A2} \geq 1$ mm.

9. A method for preparing the electrode sheet according to any one of claims 6-8, comprising the steps of:

mixing a first binder with water and performing dissolving and mixing to obtain a binder solution;

uniformly mixing a first conductive agent and an inorganic filler with the binder solution, or uniformly mixing a first conductive agent, a thermally stable active material, and an inorganic filler with the binder solution, to obtain a safety coating slurry; and

coating the safety coating slurry on one side surface or both side surfaces of a current collector, or on one side surface of an active material layer facing away from the current collector, to obtain the electrode sheet.

10. The method for preparing the electrode sheet according to claim 9, comprising at least one of the following:

C1) a mass ratio of the first conductive agent, the first binder, and the inorganic filler is 0.5-5: 1-21.2: 73.8-98.5;

C2) a solid content of the binder solution is 10% to 30%;

C3) a viscosity of the binder solution is 1×10^3 mPa·s to 3×10^4 mPa·s;

C4) a solid content of the safety coating slurry is ≥10%;

C5) a viscosity of the safety coating slurry is ≥50 mPa·s;

C6) a dyne value of the current collector is ≥30 dyn/cm;

C7) the safety coating slurry is coated on one side surface or both side surfaces of the current collector, or on one side surface of the active material layer facing away from the current collector by gravure printing;

C8) when C7) is included, an temperature of an oven during the gravure printing is 90-110 °C, and a printing speed is 10-50 m/min; and

C9) a mass ratio of the first conductive agent, the first binder, the inorganic filler, and the thermally stable active material is 0.5-5: 1-21.2: 1-97.5: 1-97.5.

11. A lithium-ion battery, comprising a positive electrode sheet, a negative electrode sheet, and a separator arranged between the positive electrode sheet and the negative electrode sheet; wherein the positive electrode sheet and/or the negative electrode sheet is the electrode sheet according to any one of claims 6-8, or the electrode sheet prepared by the method according to any one of claims 9-10.

12. Use of the lithium-ion battery according to claim 11 in an energy storage device, a power-consuming device, or an electronic device.