CLAIMS

1. A melamine cyanurate (MCA) flame-retardant black polyamide composite material capable of high-definition laser marking, comprising the following components in parts by weight:

polyamide resin	50 parts to 74 parts;
glass fiber	20 parts to 40 parts;
MCA flame retardant	5 parts to 13 parts;
carbon black	0.1 parts to 0.5 parts;
lubricant	0.2 parts to 0.6 parts;
antioxidant	0 parts to 0.5 parts;

wherein the polyamide resin is one or both of PA6 and PA66 having a relative viscosity of 2.0 to 2.4, and the MCA has an average particle size of 6 μm to 10 μm;

wherein the composite material is prepared by a method comprising a blending step:

A: melting and shear blending components except MCA in a screw extruder according to raw material formulation to obtain a pre-dispersed system; and

B: adding MCA into the pre-dispersed system, and subjecting the mixture to shear blending in a screw extruder to obtain a well-dispersed composite material melt.

2. The composite material according to claim 1, wherein the MCA flame retardant is in an amount of 6 to 10 parts by weight.

3. The composite material according to claim 1, wherein a ratio of the MCA flame retardant to the carbon black is 15:1 to 40:1.

4. The composite material according to claim 1, wherein the glass fiber is alkali-free glass fiber.

5. The composite material according to claim 1, wherein the carbon black is medium- to high-pigment carbon black.

6. The composite material according to claim 1, wherein the lubricant comprises one or more of ethylene bis-stearamide, calcium stearate, and ethylene bis-stearamide modifier.

7. The composite material according to claim 1, wherein the antioxidant comprises one or more of hindered phenols and phosphite esters.

8. The composite material according to claim 1, wherein the antioxidant is a mixture of antioxidant S 9228 and antioxidant 1098 at a mass ratio of 1:1 to 1:3.

9. The composite material according to claim 1, wherein the composite material further comprises 0.02 to 0.1 parts by weight of a pigment.

10. The composite material according to claim 9, wherein the pigment comprises one or more of ultramarine blue, cobalt blue, and phthalocyanine blue.

11. A method for preparing the composite material according to any one of claims 1 to 10, comprising a blending step:

A: melting and shear blending components except MCA in a screw extruder according to raw material formulation to obtain a pre-dispersed system; and

B: adding MCA into the pre-dispersed system, and subjecting the mixture to shear blending

in a screw extruder to obtain a well-dispersed composite material melt.

12. The method according to claim 11, wherein, in the blending step, step A and step B are respectively performed at a main feeding port and a side feeding port of the same screw extruder.

13. The method according to claim 11, wherein, in the blending step, step A and step B are respectively performed in different screw extruders.

14. Use of the composite material according to any one of claims 1 to 10 in laser-markable black-to-white parts in the fields of low-voltage electrical apparatus and 5G circuit breakers.