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(71) Applicant (for all designated States except US): **E. I. DU PONT DE NEMOURS AND COMPANY** [US/US]; 1007 Market Street, Wilmington, Delaware 19898 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **ZHANG, Wei, W.** [CN/CN]; 89 Yinghua Road, Building 89, Room 1202, shanghai 201 203 (CN). **SUN, Nanjian** [CN/CN]; 199 Biyuan Road, Building 2, Room 601, Pudong New District, shanghai 201 206 (CN).

(74) Agent: **SHANNON, Paul, J.**; E. I. du Pont de Nemours and Company, Legal Patent Records Center, 4417 Lancaster Pike, Wilmington, Delaware 19805 (US).

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(54) Title: FLAME RESISTANT POLYAMIDE RESIN COMPOSITION AND ARTICLES COMPRISING THE SAME

(57) Abstract: Disclosed is polyamide resin composition including a polyamide resin, at least one reinforcing agent, and at least one flame retardant, wherein, (a) the polyamide resin includes at least one aliphatic polyamide and an aromatic polyamide blend including at least one semi-crystalline semi-aromatic polyamide and at least one amorphous semi-aromatic polyamide; (b) based on the total weight of the polyamide resin, about 35 to about 70 wt% of the at least one aliphatic polyamide and about 30 to about 65 wt% of the aromatic polyamide blend are present in the polyamide resin; and (c) based on the total weight of the aromatic polyamide blend, about 15 to about 80 wt% of the at least one semi-crystalline semi-aromatic polyamide and about 20 to about 85 wt% of the at least one amorphous semi-aromatic polyamide are present in the aromatic polyamide blend.



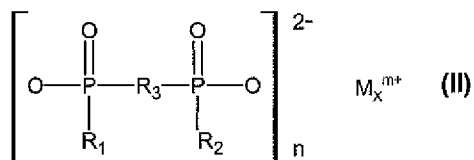
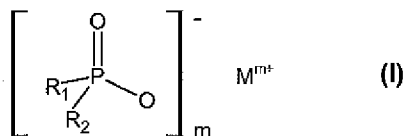
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AMENDED CLAIMS  
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1. A polyamide resin composition comprising a polyamide resin, at least one flame retardant, and at least one reinforcing agent, wherein,
  - a) the polyamide resin comprises at least one aliphatic polyamide and an aromatic polyamide blend comprising at least one semi-crystalline semi-aromatic polyamide and at least one amorphous semi-aromatic polyamide;
  - b) based on the total weight of the polyamide resin, about 35 to about 70 wt% of the at least one aliphatic polyamide and about 30 to about 65 wt% of the aromatic polyamide blend are present in the polyamide resin; and
  - c) based on the total weight of the aromatic polyamide blend, about 15 to about 80 wt% of the at least one semi-crystalline semi-aromatic polyamide and about 20 to about 85 wt% of the at least one amorphous semi-aromatic polyamide are present in the aromatic polyamide blend.
  
2. The polyamide resin composition of Claim 1, wherein,
  - a) based on the total weight of the polyamide resin, about 40 to about 70 wt%, or preferably about 45 to about 65 wt% of the at least one aliphatic polyamide and about 30 to about 60 wt%, or preferably about 35 to about 55 wt% of the aromatic polyamide blend are present in the polyamide resin; and
  - b) based on the total weight of the aromatic polyamide blend, about 20 to about 70 wt%, or preferably about 20 to about 60 wt% of the at least one semi-crystalline semi-aromatic polyamide and about 30 to about 80 wt%, or preferably about 40 to about 80 wt% of the at least one amorphous semi-aromatic polyamide are present in the aromatic polyamide blend.
  
3. The polyamide resin composition of Claim 1, wherein (i) the at least one aliphatic polyamide is selected from the group consisting of polyamide 6; polyamide 6,6; polyamide 4,6; polyamide 6,10; polyamide 6,12; polyamide 11; polyamide 12; polyamide 9,10; polyamide 9,12; polyamide 9,13; polyamide 9,14; polyamide 9,15; polyamide 6,16; polyamide 9,36; polyamide 10,10; polyamide 10,12; polyamide 10,13; polyamide 10,14; polyamide 12,10;

polyamide 12,12; polyamide 12,13; polyamide 12,14; polyamide 6,14; polyamide 6,13; polyamide 6,15; polyamide 6,16; polyamide 6,13; and combinations of two or more thereof, (ii) the at least one semi-crystalline semi-aromatic polyamide is selected from the group consisting of polyamide MXD,6; polyamide 12,T; polyamide 10,T; polyamide 9,T; polyamide 6,T/6,6; polyamide 6,T/6,I; polyamide 6,T/D,T; polyamide 6,6/6,T/6,I; polyamide 6/6,T; and combinations of two or more thereof, and (iii) the at least one amorphous semi-aromatic polyamide is selected from the group consisting of polyamide 6,I/6,T; polyamide 6,I; polyamide MXD,I/6,I; polyamide MXD,I/MXD,T/6,I/6,T; polyamide MXD,I/12,I; polyamide MXD,I; polyamide MACM,I/12; polyamide MACM,I/MACM,T/12; polyamide 6,I/MACM,I/12; polyamide 6,I/6,T/MACM,I/MACM,T; polyamide 6,I/6,T/MACM,I/MACM,T/12; polyamide MACM,I/MACM,12; and combinations of two or more thereof.

4. The polyamide resin composition of Claim 3, wherein the at least one aliphatic polyamide comprises polyamide 6,6; the at least one semi-crystalline semi-aromatic polyamide comprises polyamide 6,T/6,6; and the at least one amorphous semi-aromatic polyamide comprises polyamide 6,I/6,T.
5. The polyamide resin composition of Claim 1, wherein the at least one flame retardant is present in the polyamide resin composition at a level of about 5 to about 45 wt% relative to the weight of the polyamide resin.
6. The polyamide resin composition of Claim 5, wherein the at least one flame retardant comprises at least one selected from the group consisting of phosphinates of the formula (I), disphosphinates of the formula (II), and combinations or polymers thereof



wherein  $R_1$  and  $R_2$  are identical or different and each of  $R_1$  and  $R_2$  is a linear or branched  $C_1$ - $C_6$  alkyl group or an aryl;  $R_3$  is a linear or branched  $C_1$ - $C_{10}$  alkylene group, a  $C_6$ - $C_{10}$  arylene group, an alkyl-arylene group, or an aryl-alkylene group;  $M$  is selected from the group consisting of calcium ions, magnesium ions, aluminum ions, zinc ions, and combinations of two or more thereof;  $m$  is an integer of 2 or 3;  $n$  is an integer of 1 or 3; and  $x$  is an integer of 1 or 2.

7. The polyamide resin composition of Claim 6, wherein the at least one flame retardant may further comprises one or more selected from the group consisting of condensation products of melamine, reaction products of melamine with phosphoric acid, reaction products of condensation products of melamine with phosphoric acid, and combinations of two or more thereof.
8. The polyamide resin composition of any of Claims 1-7, wherein the at least one reinforcing agent is present in the polyamide resin composition at a level of about 20 to about 60 wt%, based on the total weight of the polyamide resin composition.
9. The polyamide resin composition of Claim 8, wherein the polyamide resin composition further comprises one or more other additives selected from the group consisting of flame retardant synergists, zinc borate, impact modifiers, ultraviolet light stabilizers, heat stabilizers, antioxidants, flow enhancers, processing aids, lubricants, colorants, and combinations of two or more thereof.
10. A molded article comprising the polyamide resin composition of Claim 8.

11. The molded article of Claim 10, which is a housing part for a portable electronic device.
12. The molded article of Claim 11, wherein the portable electronic device is selected from the group consisting of mobile telephones, personal digital assistants, laptop computers, tablet computers, global positioning system receivers, portable games, radios, and cameras and camera accessories.