comprising cerium dioxide, a UV-absorber and/or a second radical catcher; (2) agent for the stabilization of organic polymer comprising a combination of cerium dioxide, a UV-absorber and/or at least a second radical catcher; and (3) a procedure for the stabilization of organic polymer, preferably in the form of polymer based formulation, lacquer, color or coating mass against photochemically, thermally, physically and/or chemically induced dismantling through free radical, comprising mixing cerium dioxide as inorganic radical catcher, optionally in combination with the UV-absorber or with the second radical catcher.

[0011] And, US 9,969,882 discloses polyamide molding compounds which have an improved resistance to heat-aging and comprise the following compositions: (A) 25 to 84.99 wt.% of at least one polyamide, (B) 15 to 70 wt.% of at least one filler and reinforcing means, (C) 0.01 to 5.0 wt.% of at least one inorganic radical interceptor, (D) 0 to 5.0 wt.% of at least one heat stabilizer which is different from the inorganic free-radical scavenger under (C), and (E) 0 to 20.0 wt.-% of at least one additive. The invention further relates to molded articles produced from these polyamide molding compounds as components in the automobile or electrics/electronics sector.

[0012] Even in view of the references, the need exists for improved polyamide compositions that demonstrate superior performance over a broad temperature range, in particular, that demonstrates significant improvements in tensile strength and impact resilience (among other performance characteristics) at higher temperature ranges, e.g., above 190°C or from 190°C to 220°C.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Figure 1 is a graph showing the tensile strength retention achieved by an embodiment of the disclosed composition at 2500 hours heat age.

[0014] Figure 2 is a graph showing the tensile strength retention achieved by an embodiment of the disclosed composition at 3000 hours heat age.

SUMMARY

[0015] In some examples, the disclosure relates to a heat-stabilized polyamide composition comprising (from 25 wt% to 99 wt%% of) an amide polymer, e.g., PA-6,6 or PA-6,6/6T, or combinations thereof, having an amine end group level greater than 50 μeq/gram, e.g., greater than 65 μeq/gram, or from 65 μeq/gram to 105 μeq/gram, e.g., from 65 μeq/gram to 75

polyamide composition demonstrates an impact resilience of greater than 17 kJ/m^2, as measured at 23°C. In some cases, the amide polymer has an amine end group level greater than 65 µeq/gram; the amide polymer comprises PA-6,6; the composition further comprises an additional polyamide; the lanthanoid-based compound comprises a cerium-based compound; the second heat stabilizer comprises a copper-based compound; and when heat aged for 3000 hours at a temperature of 210°C; the polyamide composition demonstrates a tensile strength greater than 82 MPa, as measured at 23°C; and when heat aged for 3000 hours at a temperature of 210°C; the polyamide composition demonstrates a tensile strength retention greater than 41%, as measured at 23°C; and when heat aged for 3000 hours at a temperature of 210°C; the polyamide composition demonstrates an impact resilience greater than 13 kJ/m^2, as measured at 23°C.

[0015a] In one aspect, the present disclosure refers to a heat-stabilized polyamide composition comprising:

from 25 wt% to 99 wt% of an amide polymer having an amine end group level greater than 50 µeq/gram;

a first stabilizer comprising a lanthanoid-based compound;

a second stabilizer; and

from 0 wt% to 65 wt% filler;

wherein, when heat aged for 3000 hours over a temperature range of from 190°C to 220°C, the polyamide composition demonstrates a tensile strength retention of greater than 51%, as measured at 23°.

[0016] In one aspect, the present disclosure relates to an automotive part comprising the heat-stabilized polyamide composition as disclosed herein, wherein, when heat aged for 3000 hours at a temperature of 210°C, the automotive part demonstrates an impact resilience greater than 13 kJ/m^2, as measured at 23°C. In another aspect, the present disclosure relates to an article for use in high temperature applications, wherein the article is formed from the heat-stabilized polyamide composition as disclosed herein, wherein the article is used for fasteners, circuit breakers, terminal blocks, connectors, automotive parts, furniture parts, appliance parts, cable ties, sports equipment, gun stocks, window thermal breaks, aerosol valves, food film packaging, automotive/vehicle parts, textiles, industrial fibers, carpeting, or electrical/electronic parts.

DETAILED DESCRIPTION

[0017] This disclosure relates to heat-stabilized polyamide compositions that employ amide polymers having specific levels of amine end groups (AEG), which provide for significant improvements in performance, e.g., tensile strength and/or impact resilience, at higher temperatures and under heat age conditions. Conventional polyamide compositions typically utilize heat stabilizer packages to address high temperature performance. Unfortunately, many of these heat stabilizer packages, standing alone, suffer from stability/performance gaps over broad temperature ranges, e.g., the 190°C to 220°C temperature range. As a result, the polyamide structures formed from the compositions are prone to performance and/or structural failures.

[0018] The disclosed polyamide compositions and structures take a different approach to address heat stability of polyamides compositions – utilization of particular AEG levels, optionally in