CLAIMS

1. A protective material comprising a rare-earth garnet ceramic having general formula

$$(R^1R^2)_aAl_5O_{12},$$

wherein

a) R^1 is selected from the group consisting of Y, Yb, and combinations thereof, and R^2 is selected from the group consisting of Eu, Gd, Tb, Ho, Tm, Lu, and combinations thereof, R^1 being present in an amount that is more than 90 atomic % of total amount of R^1 and R^2, and R^2 being present in an amount that is 10 atomic % or less of total amount of R^1 and R^2, and a is in the range from 3.005 to 3.015, or

b) R^1 is Yb, or a combination of Y and Yb wherein atomic ratio of Y to Yb is in the range of 1:1 to 1:4, and R^2 is selected from the group consisting of Eu, Gd, Tb, Ho, Tm, Lu, and combinations thereof, R^1 is present in an amount that is more than 90 atomic % and less than 100 atomic % of total amount of R^1 and R^2, and R^2 is present in an amount that is greater than 0 atomic %, and 10 atomic % or less of total amount of R^1 and R^2, and a is in the range from 3 to 3.015.

2. The protective material according to claim 1, wherein a is 3 in b).

3. The protective material according to claim 1 or 2, further comprising a sintering agent of at least one of a metal oxide or a metal fluoride selected from the group consisting of SiO_2, MgO, CaO, MgF_2, CaF_2, YF_3, AlF, and combinations thereof.

4. The protective material according to claim 3, wherein the sintering agent constitutes less than 1000 ppm of the protective material.

5. The protective material according to any one of claims 1 to 4, wherein the rare-earth garnet ceramic comprises grains having an average size in the range of 1 µm to 20 µm.

6. The protective material according to any one of claims 1 to 5, wherein the rare-earth garnet ceramic comprises pores having an average size of 100 µm or less, preferably less than 5 µm.

7. The protective material according to claim 6, wherein the protective material has a pore volume in the range of 10 ppm to 1000 ppm.

8. The protective material according to any one of claims 1 to 7, wherein the protective material has a three-point bending strength in the range of 150 MPa to 450 MPa.

9. The protective material according to any one of claims 1 to 8, wherein the protective material has an optical transmittance of more than 65 %, as measured on a sample of the protective material having a thickness of 1 cm and using a radiation having a wavelength of 550 nm.

10. The protective material according to any one of claims 1 to 9, wherein the protective material is a ballistic-resistant material.

11. A ballistic resistant article comprising

a) a polymeric support, and
b) the protective material according to any one of claims 1 to 10 attached to the polymeric support.

12. The ballistic resistant article according to claim 11, wherein the protective material is in the form of one or more tiles having a thickness of less than 25 mm.

13. The ballistic resistant article according to claim 12, wherein the one or more tiles have a cross-sectional area in the range of 16 cm^2 to 100 cm^2 and an aspect ratio of 2 or less.

14. The ballistic resistant article according to any one of claims 11 to 13, wherein the one or more tiles has a shape capable of tessellation.

15. The ballistic resistant article according to any one of claims 11 to 14, in the form of goggles, safety glasses, personal protective equipment, window, screen, windscreen, panel, optical sensor, imager, windows of aircrafts, windows and bridges of ships, windows of building infrastructure, structural member of a military equipment or a vehicle.

16. Use of the protective material according to any one of claims 1 to 10 in goggles, safety glasses, personal protective equipment, window, screen, windscreen, panel, optical sensor, imager, windows of aircrafts, windows and bridges of ships, windows of building infrastructure, structural member of a military equipment or a vehicle, vehicles as jet fighter canopies, aircraft windows, helicopter canopies or windows; windows, barriers or doors in police or military installations, jails, schools, sport halls, prisons, or hospitals; protective shields for police or military personnel; lenses and windows in optical devices, goggles, safety glasses, windows, screens, eyeglass lenses, camera lenses, microscope lenses, telescope lenses; LED (light-emitting diode) lenses and windows; protective cover for watches and clocks; diffusers, protective and/or decorative covers and bulb materials for artificial lighting, automotive headlights, highway, parking lot lighting.