CLAIMS:

1. A neutron scintillator composite, comprising:

a neutron scintillator of the formula Li_yMgBr_{y+2}, where y = 2, 4 or 6; and

a binder having an index of refraction that is substantially identical to an index of refraction of the neutron scintillator.

2. The composite of claim 1, wherein the neutron scintillator incorporates a scintillation activator.

3. The composite of claim 2, wherein the scintillation activator comprises cerium.

4. The composite of claim 3, wherein the neutron scintillator has the formula $Li_yMg_{1-x}Ce_xBr_{y+2}$ where $0 \leq x < 1$ and y = 2, 4 or 6.

5. The composite of claim 3, wherein the neutron scintillator is $Li_6Mg_{1-x}Ce_xBr_8$, where $0 \leq x < 1$.

6. The composite of claim 3, wherein the neutron scintillator is $Li_4Mg_{1-x}Ce_xBr_6$, where $0 \leq x < 1$.

7. The composite of claim 3, wherein the neutron scintillator is $Li_2Mg_{1-x}Ce_xBr_4$, where $0 \leq x < 1$.

8. The composite of claim 1, wherein the binder is selected from a thermoplastic resin and a thermoset resin.

9. The composite of claim 1, wherein the binder is selected from the group consisting of acrylate-based resin, epoxy resin, polycarbonate resin, and combinations thereof.

10. The composite of claim 1, wherein the neutron scintillator composite has sufficient flowability to be formed into a shaped article.

11. A method for making a neutron scintillator composite comprising:

mixing (a) a neutron scintillator of formula Li_yMgBr_{y+2}, where y = 2, 4 or 6 and (b) a binder.

12. The method of claim 11, wherein the neutron scintillator further comprises a scintillation activator.

13. The method of claim 11, wherein the scintillation activator is cerium.

14. The method of claim 11, wherein the neutron scintillator has the formula

$$Li_yMg_{1-x}Ce_xBr_{y+2}, \text{ where } 0 \leq x < 1 \text{ and } y = 2, 4 \text{ or } 6.$$

15. The method of claim 11, wherein the binder comprises a thermoplastic resin or a thermoset resin.

16. The method of claim 11, wherein the binder is selected from the group consisting of acrylate-based resin, epoxy resin, polycarbonate resin, and combinations thereof.

17. The method of claim 11, wherein the binder provides the neutron scintillator composite with sufficient flowability to be formed into a shaped article.

18. An article comprising the neutron scintillator composite of claim 1.

19. The article of claim 18, wherein the article is a radiation detector comprising the neutron scintillator composite of claim 1 optically coupled to a photosensor.

20. The radiation detector of claim 19, wherein the neutron scintillator composite forms a neutron sensing element of the radiation detector, wherein photons emitted within the neutron sensing element are collected and channeled through the neutron sensing element and into a photosensing element.

21. A method for making a neutron scintillator composite, the method comprising mixing a Ce-containing neutron scintillator of the formula Li_yMgBr_{y+2}, where y = 2, 4 or 6 and a binder having an index of refraction that is substantially identical to an index of refraction of the neutron scintillator.

22. The method of claim 21, wherein the amount of neutron scintillator present in the composite is about 5% to about 60% by weight.

23. The method of claim 21, wherein the amount of neutron scintillator present in the composite is about 10% to about 30% by weight.

24. The method of claim 21, wherein the amount of neutron scintillator present in the composite is about 15% to about 20% by weight.

25. The method of claim 21, wherein the amount of neutron scintillator present in the composite is about 5% to about 30% by volume.

26. The method of claim 21, wherein the Ce-containing neutron scintillator of formula Li_yMgBr_{y+2}, where y = 2, 4 or 6 is prepared by:

(a) combining stoichiometric amounts of LiBr, MgBr2 and CeBr3 to obtain a mixture;

(b) grinding the mixture to obtain a fine powder;

(c) heating the powder to a temperature of about 600°C to about 800°C to obtain the neutron scintillator.

27. The method of claim 26, wherein said heating step is performed in an environment essentially free of moisture and air.

CLAIMS

1. A neutron scintillator composite, comprising:
a neutron scintillator of the formula Li_yMgBr_{y+2}, where y=2, 4 or 6; and

a binder having an index of refraction that is substantially identical to an index of refraction of the neutron scintillator.

2. The composite of claim 1, wherein the neutron scintillator incorporates a scintillation activator.

3. The composite of claim 2, wherein the scintillation activator comprises cerium.

4. The composite of claim 3, wherein the neutron scintillator has the formula $Li_yMg_{1-x}Ce_xBr_{y+2}$ where $0 \leqq x < 1$ and y=2, 4 or 6.

5. The composite of claim 3, wherein the neutron scintillator is $Li_6Mg_{1-x}Ce_xBr_8$, where $0 \leqq x < 1$.

6. The composite of claim 3, wherein the neutron scintillator is $Li_4Mg_{1-x}Ce_xBr_6$, where $0 \leqq x < 1$.

7. The composite of claim 3, wherein the neutron scintillator is $Li_2Mg_{1-x}Ce_xBr_4$, where $0 \leqq x < 1$.

8. The composite of claim 1, wherein the binder is selected from a thermoplastic resin and a thermoset resin.

9. The composite of claim 1, wherein the binder is selected from the group consisting of acrylate-based resin, epoxy resin, polycarbonate resin, and combinations thereof.

10. The composite of claim 1, wherein the neutron scintillator composite has sufficient flowability to be formed into a shaped article.

11. A method for making a neutron scintillator composite comprising:

mixing (a) a neutron scintillator of formula Li_yMgBr_{y+2}, where y=2, 4 or 6 and (b) a binder.

12. The method of claim 11, wherein the neutron scintillator further comprises a scintillation activator.

13. The method of claim 11, wherein the scintillation activator is cerium.

14. The method of claim 11, wherein the neutron scintillator has the formula

$Li_yMg_{1-x}Ce_xBr_{y+2}$, where $0 \leqq x < 1$ and y=2, 4 or 6.

15. The method of claim 11, wherein the binder comprises a thermoplastic resin or a thermoset resin.

16. The method of claim 11, wherein the binder is selected from the group consisting of acrylate-based resin, epoxy resin, polycarbonate resin, and combinations thereof.

17. The method of claim 11, wherein the binder provides the neutron scintillator composite with sufficient flowability to be formed into a shaped article.

18. An article comprising the neutron scintillator composite of claim 1.

19. The article of claim 18, wherein the article is a radiation detector comprising the neutron scintillator composite of claim 1 optically coupled to a photosensor.

20. The radiation detector of claim 19, wherein the neutron scintillator composite forms a neutron sensing element of the radiation detector, wherein photons emitted within the neutron sensing element are collected and channeled through the neutron sensing element and into a photosensing element.

21. A method for making a neutron scintillator composite, the method comprising mixing a Ce-containing neutron scintillator of the formula Li_yMgBr_{y+2}, where y=2, 4 or 6 and a binder having an index of refraction that is substantially identical to an index of refraction of the neutron scintillator.

22. The method of claim 21, wherein the amount of neutron scintillator present in the composite is about 5% to about 60% by weight.

23. The method of claim 21, wherein the amount of neutron scintillator present in the composite is about 10% to about 30% by weight.

24. The method of claim 21, wherein the amount of neutron scintillator present in the composite is about 15% to about 20% by weight.

25. The method of claim 21, wherein the amount of neutron scintillator present in the composite is about 5% to about 30% by volume.

26. The method of claim 21, wherein the Ce-containing neutron scintillator of formula Li_yMgBr_{y+2}, where y=2, 4 or 6 is prepared by:

(a) combining stoichiometric amounts of LiBr, MgBr2 and CeBr3 to obtain a mixture;

(b) grinding the mixture to obtain a fine powder;

(c) heating the powder to a temperature of about 600° C. to about 800° C. to obtain the neutron scintillator.

27. The method of claim 26, wherein said heating step is performed in an environment essentially free of moisture and air.