

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
05 January 2023 (05.01.2023)



(10) International Publication Number
WO 2023/279090 A1

(51) International Patent Classification:

H01M 10/613 (2014.01) *H01M 10/6554* (2014.01)
B32B 5/02 (2006.01) *H01M 10/6567* (2014.01)
B32B 27/06 (2006.01) *H01M 10/658* (2014.01)
H01M 10/625 (2014.01) *H01M 50/20* (2021.01)

(21) International Application Number:

PCT/US2022/073360

(22) International Filing Date:

01 July 2022 (01.07.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/218,205 02 July 2021 (02.07.2021) US
63/284,917 01 December 2021 (01.12.2021) US

(71) Applicant: **ASPEN AEROGELS, INC.** [US/US]; 30
Forbes Road, Building B, Northborough, Massachusetts
01532 (US).

(72) Inventors: **WILLIAMS, John**; 143 Lowell Road, Groton,
Massachusetts 01450 (US). **EVANS, Owen**; 2 Sonora Drive,
Chelmsford, Massachusetts 01824 (US). **BAUR, David**;
17 Voyagers Lane, Ashland, Massachusetts 01721 (US).
GOULD, George; 174 Millvile Road, Mendon, Massachu-
setts 01756 (US). **DEKRAFFT, Kathryn**; 47 Lake Street,
Hudson, Massachusetts 01749 (US). **MIHALCIK, David**;
114 Brigham Street, Northborough, Massachusetts 01532
(US). **NAM, Younggyu**; 13 Irving Street, Medford, Massa-
chusetts 02155 (US). **CAHILL, Brian**; Bothar an Chomain,
Loughanbeg, Inverin, H91 CX7N (IE). **HENNEMUTH, Robert**;
2 Hennessey Drive, Franklin, Massachusetts 02038
(US).

(74) Agent: **DELUCA, Mark R.** et al.; WOMBLE BOND
DICKINSON (US) LLP, PO Box 570489, Atlanta, Georgia
30357 (US).

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,

(54) Title: MATERIALS, SYSTEMS, AND METHODS FOR ENCAPSULATING THERMAL BARRIER MATERIALS

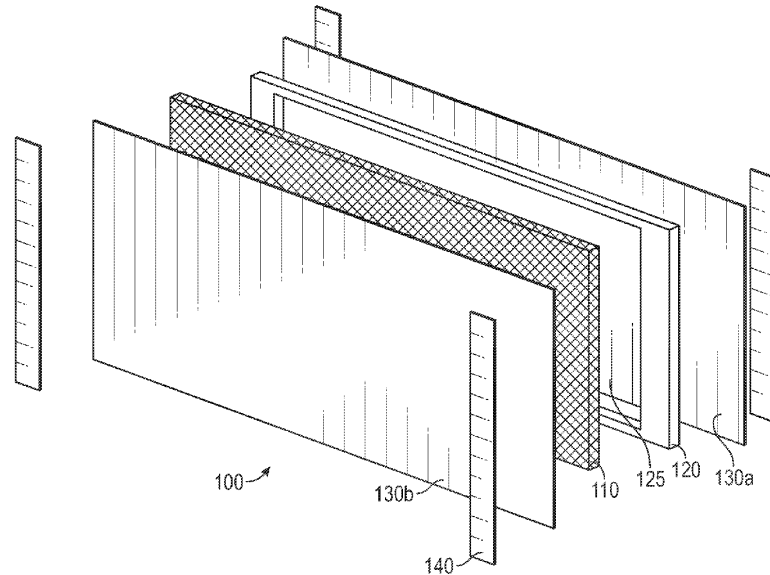


FIG. 1

(57) Abstract: The present disclosure relates to materials and systems to manage thermal runaway issues in energy storage systems. Exemplary embodiments include an insulation layer that is encapsulated to form an insulation barrier. A support member is placed around at least a portion of an insulation layer. The support member provides a support for the insulation layer, allowing the insulation layer to be easily encapsulated and installed in a battery module or pack.

[Continued on next page]



WO 2023/279090 A1

HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*