

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

MOLECULAR REBAR DESIGN,
LLC, AND BLACK DIAMOND
STRUCTURES, LLC,

Plaintiffs,

v.

LG ENERGY SOLUTION, LTD.,
Defendant.

Case No. 2:24-cv-00107-JRG
JURY TRIAL DEMANDED
(Lead Case)

MOLECULAR REBAR DESIGN,
LLC, AND BLACK DIAMOND
STRUCTURES, LLC,

Plaintiffs,

v.

SAMSUNG ELECTRONICS CO., LTD,
AND SAMSUNG ELECTRONICS
AMERICA, INC.

Defendant.

Case No. 2:24-cv-00108-JRG
JURY TRIAL DEMANDED
(Member Case)

DEFENDANTS' P.R. 3-3 INVALIDITY CONTENTIONS

Pursuant to P.R. 3-3, Defendants LG Energy Solution, Ltd. ("LGES"), Samsung Electronics Co., Ltd. ("SEC"), and Samsung Electronics America, Inc. ("SEA") (collectively "Samsung," and together with LGES "Defendants") hereby provide their Invalidity Contentions and accompanying document production with respect to the claims identified by Plaintiffs Molecular Rebar Design, LLC ("MRD"), and Black Diamond Structures, LLC ("BDS") (collectively "Plaintiffs") in their Patent Rule 3-1 Disclosures.

Defendants' Invalidity Contentions include the accompanying claim charts concerning U.S. Patent Nos. 10,153,483 (the '483 Patent), 8,808,909 (the '909 Patent), 8,968,924 (the '924 Patent), 9,636,649 (the '649 Patent), and 10,608,282 (the '282 Patent) (collectively, the "Asserted Patents").

patents, publications, and/or systems listed in the above tables as evidence of the state of the art as it relates to lithium ion batteries and/or CNTs.

Each of these references show that CNTs in lithium ion batteries as claimed is not novel and was well-known for many years before the alleged priority date, as discussed in more detail below with respect to anticipation and obviousness. In light of the references discussed herein, the Asserted Claims cannot be valid.

Each prior art patent, publication, or product identified above was either effectively filed or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because Defendants have not yet completed discovery in this case, including taking depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, Defendants reserve the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

3. '282 Patent

Table 1-E Prior Art Patents and Patent Applications

Patent No. or Title (Primary Inventor/Author)	Country of Origin	Date of Issue /Publication	Filing Date
101714627A (Chenghui)	China	May 26, 2010	Oct. 8, 2008
101207190A (Sun)	China	Jun 25, 2008	Dec. 22, 2006
13734912A (Swogger)	EP	Apr. 29, 2015	Jun. 21, 2013
2045213A1 (Su)	EP	Aug. 4, 2009	Apr. 10, 2007

Patent No. or Title (Primary Inventor/Author)	Country of Origin	Date of Issue /Publication	Filing Date
6-157016A (Ebuson)	Japan	Jun. 3, 1994	Nov. 20, 1992
H0714582A (Tabuchi)	Japan	Jan. 17, 1995	Jun. 24, 1993
2004-123505A (Shinohara)	Japan	Apr. 22, 2004	Nov. 28, 2002
2004-303613A (Watarai)	Japan	Oct. 28, 2004	Mar. 31, 2003
2005-262391A (So)	Japan	Sep. 29, 2005	Mar. 18, 2004
2005-272184A (Ohashi)	Japan	Oct. 6, 2005	Mar. 23, 2004
2006-193649A (Takase)	Japan	Jul 27, 2006	Jan. 14, 2005
2006-248888A (Sanada)	Japan	Sep. 21, 2006	Sep. 5, 2005
2008-044820A (Tomoko)	Japan	Feb. 28, 2008	Aug. 17, 2006
2008-170878A (Tomizawa)	Japan	Jul. 24, 2008	Jan. 15, 2007
2013-091783A (Takahashi)	Japan	May 15, 2013	Oct. 2, 2012
2013-98085A (Yamada)	Japan	May 20, 2013	Nov. 2, 2011
2014-531382A (Kirkor)	Japan	Nov. 27, 2014	Aug. 3, 2012
2016-196638A (Serge)	Japan	Nov. 24, 2016	Apr. 22, 2016
2016-523439A (Sohn)	Japan	Aug. 8, 2016	Jul. 31, 2014
5115989B2 (Oh)	Japan	Jan. 9, 2013	Aug. 28, 2006
6162338B2 (Lee)	Japan	Jul. 12, 2017	Dec. 22, 2014
2001-0052228A (Ogura)	Korea	Jun. 25, 2001	Sep. 29, 2000
2001-0074667A (Ren)	Korea	Aug. 8, 2001	Jun. 18, 1999
2006-0039148A (Chang)	Korea	May 8, 2006	Nov. 2, 2004
2010-0086854A (Sohn)	Korea	Aug. 2, 2010	Jan. 23, 2009
2011-0107342A (Bosnyak)	Korea	Sep. 30, 2011	Dec. 18, 2009
200921970A (Feng)	Taiwan	May 16, 2009	Nov. 9, 2007
12/968,151 (Bosnyak)	US	Jun. 23, 2011	Dec. 14, 2010
13/140,029 (Bosnyak)	US	Dec. 1, 2011	Dec. 18, 2009
13/164,456 (Bosnyak)	US	Jul. 19, 2012	Jun. 20, 2011
15/881,071 (Bosnyak)	US	Mar. 31, 2020	Jan. 26, 2018
61/500,561 (Bosnyak)	US		Jun. 23, 2011
61/638,454 (Bosnyak)	US		Apr. 25, 2012
61/662,393 (Bosnyak)	US		Jun. 21, 2012
61/663,513 (Bosnyak)	US		Jun. 22, 2012
2004/0160156 A1 (Ohata)	US	Aug. 19, 2004	Feb. 3, 2004
2005/0006623 A1 (Wong)	US	Jan. 13, 2005	Jul. 7, 2003
2005/0029498 A1 (Elkovitch)	US	Feb. 10, 2005	Aug. 6, 2004
2005/0214196 A1 (Ohashi)	US	Sep. 29, 2005	Mar. 23, 2005
2005/0229334 A1 (Huang)	US	Oct. 20, 2005	Mar. 30, 2005
2006/0001013 A1 (Dupire)	US	Jan. 5, 2006	Mar. 18, 2002
2008/0019485 A1 (Weiss)	US	Jan. 24, 2008	Feb. 27, 2007
2008/0176052 A1 (Ma)	US	Jul. 24, 2008	Aug. 20, 2007
2008/0187815 A1 (Hiromitsu)	US	Aug. 7, 2008	Jan. 14, 2008
2008/0192407 A1 (Lu)	US	Aug. 14, 2008	Oct. 27, 2006
2008/0318049 A1 (Hata)	US	Dec. 25, 2008	Jul. 27, 2005

Patent No. or Title (Primary Inventor/Author)	Country of Origin	Date of Issue /Publication	Filing Date
2009/0035469 A1 (Sue)	US	Feb. 5, 2009	Apr. 30, 2008
2009/0035707 A1 (Wang)	US	Feb. 5, 2009	Aug. 1, 2007
2009/0142665 A1 (Sheem)	US	Jun. 4, 2009	Nov. 22, 2007
2009/0181309 A1 (Kwon)	US	Jul. 16, 2009	Jan. 15, 2008
2009/0242850 A1 (Park)	US	Oct. 1, 2009	Sep. 21, 2007
2009/0269267 A1 (Lee)	US	Oct. 29, 2009	Apr. 21, 2009
2010/0075229 A1 (Atsuki)	US	Mar. 25, 2010	Mar. 28, 2008
2010/0136431 A1 (Lee)	US	Jun. 3, 2010	Oct. 2, 2009
2010/0197832 A1 (Sun)	US	Aug. 5, 2010	Feb. 2, 2010
2010/0215945 A1 (Ota)	US	Aug. 26, 2010	Aug. 8, 2008
2010/0328845 A1 (Hiralal)	US	Dec. 30, 2010	Jun. 25, 2009
2010/0330423 A1(Cui)	US	Dec. 30, 2010	Jun. 2, 2009
2011/0104551 A1 (Yang)	US	May 5, 2011	Nov. 3, 2010
2011/0124483 A1 (Shah)	US	May 26, 2011	Dec. 1, 2009
2011/0294013 A1 (Bosnyak)	US	Dec. 1, 2011	Dec. 19, 2008
2012/0052363 A1 (Fleischer)	US	Mar. 1, 2012	Aug. 29, 2011
2012/0058255 A1 (Gan)	US	Mar. 8, 2012	Sep. 8, 2010
2013/0248772 A1 (Jo)	US	Sep. 26, 2013	Mar. 26, 2012
2015/0004488 A1 (Abdelsalam)	US	Jan. 1, 2015	Jan. 30, 2012
2015/0064538 A1 (Bosnyak)	US	Mar. 5, 2015	Jun. 21, 2013
7,435,780 B2 (Borade)	US	Oct. 14,2008	May 31, 2007
8,053,113 B2 (Oh)	US	Nov. 8, 2011	Sep. 1, 2006
8,197,888 B2 (Sue)	US	Jun. 12, 2012	Apr. 30, 2008
8,894,963 B2 (Sue)	US	Nov. 25, 2014	Dec. 28, 2010
8,968,924 B2 (Bosnyak)	US	Mar. 3, 2015	Jul. 8, 2014
9,896,341 B2 (Noyes)	US	Mar. 5, 2015	Mar. 15, 2013
10,000,653 B2 (Swogger)	US	Jun. 19, 2018	Dec. 13, 2017
10,608,282 B2 (Bosnyak)	US	Mar. 31, 2020	Jan. 26, 2018
2001/007694 A1 (Niu)	WO	Feb. 1, 2001	Jul. 21, 1999
2004/065469 A1 (Von Gentzkow)	WO	Aug. 5, 2004	Jan. 23, 2003
2006/135439 A2 (Ma)	WO	Dec. 21, 2006	Oct. 22, 2004
2008/002317 A1 (Rowley)	WO	Jan. 3, 2008	Aug. 4, 2005
2009/008516 A1 (Hisashi)	WO	Jan. 15, 2009	Jul. 11, 2008
2010/076885 A1 (Kenji)	WO	Jul. 8, 2010	Dec. 30, 2008
2010/117392 A1 (Bosnyak '392)	WO	Oct. 14, 2010	Dec. 18, 2009
2011/056651 A2 (Moralez)	WO	May 12, 2011	Oct. 27, 2010
2011/163129 A2 (Swogger '129)	WO	Dec. 29, 2011	Jun. 20, 2011
2013/162650 A1 (Noyes)	WO	Oct. 31, 2013	Apr. 23, 2012
2013/192513 A2 (Swogger)	WO	Dec. 27, 2013	Jun. 21, 2013
2024/138749 A1 (Cheng)	WO	Jul. 4, 2024	Dec. 30, 2022
2016-196638 (Arkema)	Japan	Nov. 24, 2016	Apr. 22, 2016
2012-501515 (Arkema)	Japan	Jan. 19, 2012	Aug. 20, 2009

Patent No. or Title (Primary Inventor/Author)	Country of Origin	Date of Issue /Publication	Filing Date
2014-531382 (Anchor Science)	Japan	Nov. 27, 2014	Aug. 3, 2012
2016-523439 (LG Chemical)	Japan	Aug. 8, 2016	July 31, 2014
2017-500702 (LG Chemical)	Japan	Jan. 5, 2017	Dec. 22, 2014
2009-507338 (LG Chemical)	Japan	Feb. 19, 2009	Aug. 28, 2006

Table 2-E: Printed Publications

Title/Author	Date
A Comparative Investigation on Multiwalled Carbon Nanotubes and Carbon Black as Conducting Additive in LiNi _{0.7} Co _{0.3} O ₂ , Electrochemical and Solid-State Letters, 9 (Li)	Jan. 18, 2006
Adhesion and Reinforcement of CNT-fluoroelastomers Composite for Oilfield Applications, Journal of The Adhesion Society of Japan (Ito)	2011
Aspect ratio control of acid modified multiwalled carbon nanotubes, Current Applied Physics 10 (Kim)	Dec. 28, 2009
Cap Removal And Shortening Of Double-Walled And Very-Thin Multi-Walled Carbon Nanotubes Under Mild Oxidative Conditions, (R. Marega)	Mar. 1, 2009
Carbon Nanotubes As A Conductive Additive In Lifepo ₄ Cathode Material For Lithium-Ion Batteries, ISSN 1023_1935, Russian Journal Of Electrochemistry, 2010, Vol. 46 (Huang)	2010
Chemical Oxidation Of Multiwalled Carbon Nanotubes, Carbon 46 (2008) (Datsyuk)	Feb. 21, 2008
Correlations between Percolation Threshold, Dispersion State and Aspect Ratio of Carbon Nanotubes, Advanced Functional Materials 2007 (Li)	2007
Dispersion of Carbon Nanotubes in Liquids, Journal of Science and Technology Vol. 24 (Hilding)	2003
Dispersion State And Damage Of Carbon Nanotubes And Carbon Nanofibers By Ultrasonic Dispersion: A Review, (H. Rennhofer)	Jun. 1, 2021
Dispersity and Stability Measurements of Functionalized Multiwalled Carbon Nanotubes in Organic Solvents, Current Applied Physics (Kim)	2009
Effect of Chemical Oxidation on the Structure of Single-Walled Carbon Nanotubes, J. Phys. Chem. B 2003 (Zhang)	Mar. 27, 2003
Effect Of Filament Aspect Ratio On The Dielectric Response Of Multiwalled Carbon Nanotube Composites, Journal Of Applied Physics 109 (Kerr)	May 12, 2011
Effect of multi-walled carbon nanotube aspect ratio on mechanical and electrical properties of epoxy-based nanocomposites, Polymer Testing 30 (Ayatollahi)	2011
Effects of ball-milling on lithium insertion into multi-walled carbon nanotubes synthesized by thermal chemical vapour deposition, Journal of Power Sources 157 (Eom)	2006

Title/Author	Date
Effects of Oxidation by Hydrogen Peroxide on the Structures of Multiwalled Carbon Nanotubes, Ind. Eng. Chem. Res. 2006 (Peng)	Aug. 18, 2006
Fullerene Pipes, Science Magazine Vol. 280, (Liu)	May 22, 1998
High-density positive electrodes containing carbon nanotubes for use in Li-ion cells, Journal of Power Sources 158 (Sheem)	Dec. 2, 2005
Impact Of Carbon Structure And Morphology On The Electrochemical Performance Of Lifepo4/C Composites, Springer, J Solid State Electrochem (2008) (Doeff)	Sep. 19, 2007
Implementation of a Thick-Film Composite Li-Ion Microcathode Using Carbon Nanotubes as the Conductive Filler, Journal of The Electrochemical Society, 151 (Lin)	Jun. 17, 2004
Influence of aspect ratio of carbon nanotube on percolation threshold in ferroelectric polymer nanocomposite, Applied Physics Letters 91 (Yao)	Nov. 20, 2007
Influence Of Carbon Nanotubes Addition On Carbon–Carbon Supercapacitor Performances In Organic Electrolyte, Journal Of Power Sources 139 (Portet)	Sep. 18, 2004
Investigations Of Single-Wall Carbon Nanotube Growth By Time-Restricted Laser Vaporization, Physical Review B, Volume 65 (Puretzky)	June 24, 2002
Layered And Interfacially Blended Polyelectrolyte Multi-Walled Carbon Nanotube Composites For Enhanced Ionic Conductivity, (X. Gu)	Jan. 1, 2012
Long-Time Low-Impact Ball Milling Of Multi-Wall Carbon Nanotubes, Carbon 43 (Kukovecz)	Jan. 6, 2005
Modification Of Multiwall Carbon Nanotubes By Grafting From Controlled Polymerization Of Styrene: Effect Of The Characteristics Of The Nanotubes, (Albuene)	Jul. 15, 2010
Monitoring Oxidation of Multiwalled Carbon Nanotubes by Raman Spectroscopy, Journal of Raman Spectroscopy Vol. 38 (Osswald)	Apr. 11, 2007
Nanocomposites From Styrene-Butadiene Rubber (SBR) And Multiwall Carbon Nanotubes (MWCNT) Part 1: Morphology And Rheology (Peddini)	Jan. 14, 2014
Novel approach toward a binder-free and current collector-free anode configuration: highly flexible nanoporous carbon nanotube electrodes with strong mechanical strength harvesting improved lithium storage, J. Mater. Chem., 2012 (Li)	Jul. 5, 2012
Organizing Single-Walled Carbon Nanotubes on Gold Using a Wet Chemical Self-Assembling Technique, Langmuir 2000, (Liu)	Apr. 18, 2000
Preparation and Characterization of Conductive Carbon Nanotube-Polystyrene Nanocomposites using Latex Technology, Comp. Sci. and Tech. (Wu)	Aug. 2008
Statistical Characterization Of Single-Wall Carbon Nanotube Length Distribution, Nanotechnology 17 (Wang)	Jan. 6, 2006
Study Of Multi-Walled Carbon Nanotubes For Lithium-Ion Battery Electrodes, Journal Of Power Sources 196 (Varzi)	Nov. 27, 2010

Title/Author	Date
Surface Chemical Properties of Cup-Stacked-Type Carbon Nanotubes, TANSO (Toshinari)	2010
The Effect Of Carbon Nanotube Aspect Ratio And Loading On The Elastic Modulus Of Electrospun Poly(Vinyl Alcohol)-Carbon Nanotube Hybrid Fibers, (K. K. H. Wong)	Sep. 2009
Theoretical Evaluation of Stiffness Degradation Factors in Carbon-Nanotube Composites (Ono)	2008
Vertically aligned carbon nanotube electrodes for lithium-ion batteries, Journal of Power Sources 196 (Welna)	Aug. 8, 2010
An Approach to The Uniform Dispersion of a High-Volume Fraction of Carbon Nanotubes in Aluminum Powder (Jiang, Fan, Kai, Chen, Humphries, Heness, Yeung)	Jan. 14, 2011
Generation of Hydrophilic, Bamboo-Shaped Multiwalled Carbon Nanotubes by Solid-State Pyrolysis and Its Electrochemical Studies (Shanmugam, Gendanken)	Dec. 8, 2005
Measurement of The Critical Aspect Ratio and Interfacial Shear Strength in MWNT/Polymer Composites (Duncan, Chen, Bult, Brinson, Schadler)	Dec. 21, 2009
A Comparative Study of Electrochemical Properties of Two Kinds of Carbon Nanotubes as Anode Materials for Lithium Ion Batteries (NPL-4) (Yang, Huo, Song, Chen)	Sept. 29, 2007
Vertically Aligned Carbon Nanotube Electrodes for Lithium-Ion Batteries (Welnaa, Qub, Taylor, Dai, Durstock)	Aug. 8, 2010

Table 3-E: Prior Art Systems and Inventions

Name of System or Invention	Date of First Known Sale / Offer for Sale / Public Use / Known by Others
Sony's Nexelion	Feb. 2005
Sony's Cylindrical Lithium Ion Secondary battery (G8 Series) (e.g., 18650G8)	Dec. 2004
Sony's Lithium Ion Polymer Secondary Battery (A8 Series) (e.g., 383450A8)	Dec. 2004
Sony's Lithium Ion Polymer Secondary Battery (S Pack)	Dec. 2004
Sony's Cylindrical Lithium Ion Secondary battery (V Series) (e.g., 18650V)	Dec. 2004
Sony's Cylindrical Lithium Ion Secondary battery (VT Series) (e.g., 26650VT)	Dec. 2004
Sony's Fortelion series	Jun. 2009
LEV50 Lithium-ion battery	Dec. 2007
Sanyo's CR-V3	Aug. 2001
Sanyo 18650 battery	Sep. 2005
Sanyo UR18650	Sep. 2005
Sony NP-F9 series	2008
AESC L3-10	May 2008