

**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").

2. '649 Patent

Table 1-D: Prior Art Patents and Patent Applications

Patent No. or Title (Primary Inventor/Author)	Country of Origin	Date of Issue /Publication	Filing Date
100572267C (Yang)	China	Dec. 23, 2009	Jan. 18, 2008
101714627A (Chenghui)	China	May 26, 2010	Oct. 8, 2008
1226294B1 (Niu)	EP	Jun. 29, 2011	Jul. 21, 1999
2045213A1 (Su)	EP	Aug. 4, 2009	Apr. 10, 2007
2139630B1 (Bergmark)	EP	May 15, 2013	Mar. 7, 2008
2246297A1 (Kato)	EP	Nov. 3, 2010	Feb. 12, 2009
2915110A1 (Plee)	FR	Oct. 24, 2008	Apr. 20, 2007
2957926A1 (Korzhenko)	FR	Sep. 30, 2011	Mar. 25, 2010
2004-123505A (Shinohara)	Japan	Apr. 22, 2004	Nov. 28, 2002
2004-210830A (Kazuyuki)	Japan	Jul. 29, 2004	Dec. 27, 2002
2004-339407A (Kiyono)	Japan	Dec. 2, 2004	May 16, 2003
2005-262391A (So)	Japan	Sep. 29, 2005	Mar. 18, 2004
2005-272555A (Ohashi)	Japan	Oct. 6, 2005	Mar. 24, 2004
2006-193649A (Takase)	Japan	Jul. 27, 2006	Jan. 14, 2005
2006-527786 (Khabashesku)	Japan	Dec. 12, 2006	Jun. 16, 2004
2008-044820A (Tomoko)	Japan	Feb. 28, 2008	Aug. 17, 2006
2008-517863A (Ma)	Japan	May 29, 2008	Oct. 21, 2005
2008-534764A (El Bounia)	Japan	Aug. 28, 2008	Mar. 31, 2006
2008-538531A (Cooper)	Japan	Oct. 30, 2008	Apr. 22, 2005
2009-016265 (Sotowa)	Japan	Jan 12, 2009	Jul. 6, 2007
2009-102179A (Shimizu)	Japan	May 14, 2009	Oct. 19, 2007
2009-235650A (Matsushita)	Japan	Oct. 15, 2009	Mar. 28, 2008
2009-517517A (Bordere)	Japan	Apr. 30, 2009	Nov. 29, 2006
2009-041170A1 (Kazuyoshi)	Japan	Jan. 20, 2011	Aug. 8, 2008
2013-091783A (Takahashi)	Japan	May 15, 2013	Oct. 2, 2012
2013-095867A (Yoshihara)	Japan	May 20, 2013	Nov. 2, 2011
2013-523908A (Korzhenko)	Japan	Jun. 17, 2013	Mar. 21, 2011
JP2015101531 (Komukai)	Japan	Jun. 4, 2015	Nov. 28, 2013
3962691B2 (Niu)	Japan	Aug. 22, 2007	May 17, 2002
4758892B2 (Khabashesku)	Japan	Aug. 31, 2011	Jun. 16, 2004
5759772B2 (Kimura)	Japan	Aug. 5, 2015	Mar. 31, 2011
5775960B1 (Furuzono)	Japan	Sep. 9, 2015	Nov. 17, 2014
5859277B2 (Yoshihara)	Japan	Feb. 10, 2016	Nov. 2, 2011
5940658B2 (Bosnyak)	Japan	Jun. 29, 2016	Jun. 21, 2012
6307255B2 (Omochi)	Japan	Apr. 4, 2018	Nov. 28, 2013
6314165B2 (Bosnyak)	Japan	Apr. 18, 2018	Mar. 9, 2016
6857443B2 (Ma)	Japan	Apr. 14, 2021	Dec. 8, 2014
100784173 B1 (Cheong)	Korea	Dec. 10, 2007	Sep. 27, 2006

Patent No. or Title (Primary Inventor/Author)	Country of Origin	Date of Issue /Publication	Filing Date
2001-0074667A (Ren)	Korea	Aug. 8, 2001	Jun. 18, 1999
2010-0086854A (Sohn)	Korea	Aug. 2, 2010	Jan. 23, 2009
2010-0100847A (Pasquali)	Korea	Sep. 15, 2010	Oct. 29, 2008
200921970A (Feng)	Taiwan	May 16, 2009	Nov. 9, 2007
15/288,553 (Bosnyak)	US	May 2, 2017	Oct. 7, 2016
2003/0096104 A1 (Tobita)	US	May 22, 2003	Mar. 14, 2002
2003/0213939 A1 (Narayan)	US	Nov. 20, 2003	Apr. 1, 2003
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
2006/0014873 A1 (Ikezawa)	US	Jan. 19, 2006	Jan. 14, 2003
2006/0124028 A1 (Huang)	US	Jun. 15, 2006	Dec. 9, 2005
2007/0065974 A1 (Shiraishi)	US	Mar. 22, 2007	Sep. 7, 2004
2007/0158609 A1 (Hong)	US	Jul. 12, 2007	Jan. 12, 2006
2007/0238826 A1 (Fischer)	US	Oct. 11, 2007	Aug. 31, 2004
2007/0259994 A1 (Tour '994)	US	Nov. 8, 2007	Jun. 23, 2004
2008/0023396 A1 (Fugetsu)	US	Jan. 31, 2008	May 13, 2005
2008/0031802 A1 (Ma)	US	Feb. 7, 2008	Oct. 21, 2005
2008/0093968 A1 (Takai)	US	Apr. 24, 2008	Jun. 14, 2002
2008/0176052 A1 (Ma)	US	Jul. 24, 2008	Aug. 20, 2007
2008/0207817 A1 (El Bounia)	US	Aug. 28, 2008	Mar. 31, 2005
2008/0315453 A1 (Molitor)	US	Dec. 25, 2008	Jun. 22, 2007
2008/0318049 A1 (Hata)	US	Dec. 25, 2008	Jul. 27, 2005
2009/0035469 A1 (Sue)	US	Feb. 5, 2009	Apr. 30, 2008
2009/0042136 A1 (Tour '136)	US	Feb. 12, 2009	Jan. 21, 2005
2009/0142665 A1 (Sheem)	US	Jun. 4, 2009	Nov. 22, 2007
2009/0168301 A1 (Viswanathan)	US	Jul. 2, 2009	Sep. 29, 2008
2009/0176924 A1 (Bordere)	US	Jul. 9, 2009	Nov. 29, 2006
2009/0200517 A1 (El Bounia)	US	Aug. 13, 2009	Apr. 10, 2007
2009/0269267 A1 (Lee)	US	Oct. 29, 2009	Apr. 21, 2009
2010/0006152 A1 Hatton)	US	Jan. 14, 2010	Dec. 22, 2006
2010/0009165 A1 (Patel)	US	Jan. 14, 2010	Jul. 10, 2008
2010/0016473 A1 (Kaji)	US	Nov. 8, 2007	Nov. 8, 2007
2010/0075229 A1 (Atsuki)	US	Mar. 25, 2010	Mar. 28, 2008
2010/0124713 A1 (Farrugia)	US	May 20, 2010	Nov. 17, 2008
2010/0136431 A1 (Lee)	US	Jun. 3, 2010	Oct. 2, 2009
2010/0181200 A1 (Yang)	US	Jul. 22, 2010	Jan. 22, 2009
2010/0197832 A1 (Sun)	US	Aug. 5, 2010	Feb. 2, 2010
2010/0215945 A1 (Ota)	US	Aug. 26, 2010	Aug. 8, 2008
2010/0247381 A1 (Yodh)	US	Sep. 30, 2010	May 21, 2003

Patent No. or Title (Primary Inventor/Author)	Country of Origin	Date of Issue /Publication	Filing Date
2010/0283000 A1 (Shimizu)	US	Nov. 11, 2010	Jul. 6, 2007
2011/0104551 A1 (Yang)	US	May 5, 2011	Nov. 3, 2010
2011/0165462 A1 (Zhamu)	US	Jul. 7, 2011	Jan. 7, 2010
2011/0183253 A1 (Aga)	US	Jul. 28, 2011	Dec. 8, 2010
2011/0220851 A1 (Sue)	US	Sep. 15, 2011	Dec. 28, 2010
2011/0272856 A1 (Rasmussen)	US	Nov. 10, 2011	Apr. 14, 2011
2011/0294013 A1 (Bosnyak '013)	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
2014/0332731 (Ma)	US	Nov. 13, 2014	July 22, 2014
3,471,395 (Sumner)	US	Oct. 7, 1969	Dec. 12, 1966
4,421,878 (Close)	US	Dec. 20, 1983	Nov. 25, 1981
4,625,761 (Uchida)	US	Dec. 2, 1986	Nov. 1, 1984
5,079,123 A (Nanya)	US	Jan. 7, 1992	May 30, 1990
5,458,681 A (Hasegawa)	US	Oct. 17, 1995	Jan. 13, 1994
5,750,304 A (Yamaguchi)	US	May 12, 1998	Apr. 16, 1996
6,544,326 B1 (Itou)	US	Apr. 8, 2003	Jan. 22, 1999
6,569,231 B1 (Mathias)	US	May 27, 2003	Oct. 16, 2000
7,070,753 B2 (Niu)	US	Jul. 4, 2006	May 17, 2002
7,091,120 B2 (Buretea)	US	Mar. 24, 2005	Aug. 4, 2004
7,163,973 B2 (Ahsan)	US	Jan. 16, 2007	Aug. 8, 2002
7,276,088 B2 (Huang)	US	Oct. 2, 2007	Apr. 15, 2004
7,390,767 B2 (Smalley)	US	Jun. 24, 2008	Dec. 5, 1997
7,566,434 B1 (Yang)	US	Jul. 28, 2009	Apr. 2, 2002
7,749,682 B2 (Miyabe)	US	Jul. 6, 2010	Nov. 28, 2008
7,807,127 B1 (Forohar)	US	Oct. 5, 2010	Apr. 14, 2006
7,846,998 B2 (Akagi)	US	Dec. 7, 2010	Mar. 3, 2005
7,880,376 B2 (Takai)	US	Feb. 1, 2011	Jun. 14, 2002
7,910,650 B2 (Fischer)	US	Mar. 22, 2011	Aug. 31, 2004
7,959,280 B2 (Koike)	US	Jun. 14, 2011	Nov. 9, 2007
8,197,888 B2 (Sue)	US	Jun. 12, 2012	Apr. 30, 2008
8,282,725 B2 (Shimomura)	US	Oct. 9, 2012	Apr. 9, 2010
8,894,963 B2 (Sue)	US	Nov. 25, 2014	Dec. 28, 2010
8,912,243 B2 (Glew)	US	Dec. 16, 2014	Aug. 3, 2007
9,327,054 B2 (Sundara)	US	May 3, 2016	Nov. 17, 2010
9,353,240 B2 (Bosnyak)	US	May 31, 2016	Oct. 27, 2015
9,422,413 B1 (Bosnyak)	US	Aug. 23, 2016	May 27, 2016
9,493,626 B1 (Bosnyak)	US	Nov. 15, 2016	Aug. 1, 2016
9,636,649 B2 (Bosnyak)	US	May 2, 2017	Oct. 7, 2016
2001/007694 A1 (Niu)	WO	Feb. 1, 2001	Jul. 21, 1999
2005/012162 A2 (Takai)	WO	Feb. 10, 2005	Jul. 9, 2004
2006/135439 A2 (Ma)	WO	Dec. 21, 2006	Oct. 22, 2004

Patent No. or Title (Primary Inventor/Author)	Country of Origin	Date of Issue /Publication	Filing Date
2008/002317 A1 (Rowley)	WO	Jan. 3, 2008	Aug. 4, 2005
2009/017859 A2 (Sue)	WO	Feb. 5, 2009	Apr. 30, 2008
2009/041170 A1 (Kazuyoshi)	WO	Apr. 2, 2009	Aug. 8, 2008
2010/102732 A1 (Meyer)	WO	Sep. 16, 2010	Mar. 13, 2009
2010/115550 A1 (Vogel)	WO	Oct. 14, 2010	Apr. 9, 2009
2010/117392 A1 (Bosnyak)	WO	Oct. 14, 2010	Dec. 19, 2008
2011/117522 (Korzhenko)	WO	Sept. 29, 2011	Mar. 25, 2010
2011/163129 A2 (Swogger '129)	WO	Dec. 29, 2011	Jun. 20, 2011
2012/080160 A1 (Bosnyak)	WO	Jun. 21, 2012	Dec. 12, 2011

Table 2-D: Printed Publications

Title/Author	Date
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
Carbon Nanotube Fiber, Science Popularization Online (Wang)	May 12, 2010
Carbon nanotubes grown in situ on graphene nanosheets as superior anodes for Li-ion batteries (Chen)	2011
Carbon Nanotubes As A Conductive Additive In Lifepo4 Cathode Material For Lithium-Ion Batteries, ISSN 1023_1935, Russian Journal Of Electrochemistry, 2010, Vol. 46 (Huang)	2010
Characterization of Zirconium Phosphate/Polycation Thin Films Grown by Sequential Adsorption Reactions, Chemistry of Materials, Vol 9, Issue 6 (Kim)	Jun. 17, 1997
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
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 multi-walled carbon nanotube aspect ratio on mechanical and electrical properties of epoxy-based nanocomposites, Polymer Testing 30 (Ayatollahi)	2011
Effect of Non-Ionic Surfactants on the Dispersion of Multiwalled Carbon Nanotubes at High Loading in Ethanol, Acta Phys. – Chim. Sin. (Wu Bin)	Mar. 26, 2009

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
Electrical conductivity of chemically modified multiwalled carbon nanotube/epoxy composites, Carbon 43 (Kim)	Oct. 18, 2004
Electrospinning of Polyvinylidene Difluoride with Carbon Nanotubes: Synergistic Effects of Extensional Force and Interfacial Interaction on Crystalline Structures, Langmuir 2008, 24 (Huang)	Oct. 29, 2008
Elements of X-Ray Diffraction, Addison-Wesley Publishing Co.	1978
Energy storage/conversion device based on carbon nanotube composite (Jeong)	Dec. 2007
Fluoroelastomer-Modified Thermoset Resins, American Chemical Society, Advances in Chemistry Vol. 208 (Mijovic)	1984
Fullerene Pipes, Science Magazine Vol. 280, (Liu)	May 22, 1998
Functionalization Of Single-Walled Carbon Nanotubes, Chem. Int. Ed. 2002 (Hirsch)	2002
Impact Of Carbon Structure And Morphology On The Electrochemical Performance Of Lifepo4/C Composites, Springer, J Solid State Electrochem (2008) (Doeff)	Sep. 19, 2007
Improved RIM Processing with Silicone Internal Mold Release Technology, Journal of Cellular Plastics, Vol. 20, Issue 5 (Plevyak)	Sep. 1984
Interim evaluation report on “Development of new nanoelectronics semiconductor materials and new nanoelectronic device technologies” (Interim Report)	Oct. 2009
Isotropic-Nematic Phase Transition of Dispersions of Multiwall Carbon Nanotubes, Macromolecules (Song)	Jun. 16, 2005
Modification of Multiwall Carbon Nanotubes by grafting from Controlled Polymerization and their Dispersion in a Block Copolymer Matrix (Albuerne)	2009
Modification of multi-walled carbon nanotubes with fatty acid and their tribological properties as lubricant additive, Carbon 43 (Chen)	Mar. 13, 2005
Mold-Release Agents and Coatings, Tribology & Lubrication Technology; Park Ridge Vol. 64, Issue 10 (Canter)	Oct. 2008
Monitoring Oxidation of Multiwalled Carbon Nanotubes by Raman Spectroscopy, Journal of Raman Spectroscopy Vol. 38 (Osswald)	Apr. 11, 2007
Morphological, Electrical and Mechanical Properties of Ultrahigh Molecular Weight Polyethylene and Multi-wall Carbon Nanotube Composites Prepared in Decalin and Paraffin, Polymer Journal, Vol. 39 No. 6 (Bin)	2007
Multiwalled carbon nanotubes grafted with polyhedral oligomeric silsesquioxane and its dispersion in poly(l-lactide) matrix, Polymer Vol. 49 (Chen)	2008
Organizing Single-Walled Carbon Nanotubes on Gold Using a Wet Chemical Self-Assembling Technique, Langmuir 2000, (Liu)	Apr. 18, 2000
Polymer Chemistry, Second Edition, CRC Press (Hiemenz)	2007

Title/Author	Date
Preparation and Characterization of Conductive Carbon Nanotube-Polystyrene Nanocomposites using Latex Technology, Comp. Sci. and Tech. (Wu)	Aug. 2008
Preparation of colloidal carbon nanotube dispersions and their characterisation using a disc centrifuge, Carbon 46 (Nadler)	Jun. 6, 2008
Sonochemical Oxidation Of Multiwalled Carbon Nanotubes, Langmuir 2005 (Xing)	Mar. 7, 2005
Synthesis of Multi-walled Carbon Nanotube/Poly(ethylene oxide) Hybrids, Polymer (Korea), Vol. 34, No. 3 (Hong)	2010
Study on the negative electrode of tin-based alloy system for lithium-ion batteries (Zhao)	Dec. 2006
Surface Chemical Properties of Cup-Stacked-Type Carbon Nanotubes, TANSO (Toshinari)	2010
Surface Modified Multi-Walled Carbon Nanotubes In CNT/Epoxy-Composites (Gojny)	Jan. 2, 2003
Theoretical Evaluation of Stiffness Degradation Factors in Carbon-Nanotube Composites (Ono)	2008
Thermal and electrical conductivities of water-based nanofluids prepared with long multiwalled carbon nanotubes, J. Appl. Phys. 103 (Glory)	Feb. 20, 2008
Vertically aligned carbon nanotube electrodes for lithium-ion batteries, Journal of Power Sources 196 (Welna)	Aug. 8, 2010

Table 3-D: 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

Name of System or Invention	Date of First Known Sale / Offer for Sale / Public Use / Known by Others
AESC L3-10	May 2008

For each of the prior art devices identified above, Defendants have listed and produced documents as evidence of the relevant features and functionality to the extent that they are presently available. Defendants have obtained or are in the process of attempting to obtain the identified devices and will make them available for inspection to the extent they are obtained. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under §§ 102 and/or 103.

Further, Defendants are actively searching for information regarding at least the systems, devices, and/or inventions listed in the table above. Defendants refer to and incorporate the discussion of prior art systems above in Section II.A.1.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly. Defendants continue to investigate each of the identified devices, including through potential discovery needed to be obtained via third party subpoenas, and reserve the right to supplement these contentions and accompanying claim charts after further investigation.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself as well as to any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States