

## 中国汽车 China Automobiles

### 新能源汽车电池展望：动力电池装车量高景气延续，材料结构技术突破催生新机遇 EV Battery Demand Continues to Grow, Technology Breakthroughs Pave the Way for Mass Adoption

观点聚焦 Investment Focus

股票名称	评级	目标价	市盈率 P/E	
			2022E	2023E
比亚迪	Outperform	309.80	55	37
长安汽车	Outperform	11.58	16	n.a.
赛力斯	Outperform	75.25	n.a.	719
伯特利	Outperform	31.25	n.a.	78
江淮汽车	Outperform	13.90	80	n.a.

(Please see APPENDIX 1 for English summary)

**受下游新能源车需求拉动，动力电池产销维持高景气。**2022年1-11月，我国动力电池累计产量489.2GWh，同增160%。全球动力电池装机量约436GWh，同增78%；我国动力电池累计装车量258.5GWh，同增102%。锂电企业积极推进产能建设，根据高工锂电统计，2022年全球动力电池产能超过1,000GWh，正式步入TWh时代。我们认为，2023年在行业增速基础上，叠加单车带电量提升趋势，锂电池出货量增速将继续高于行业增速。

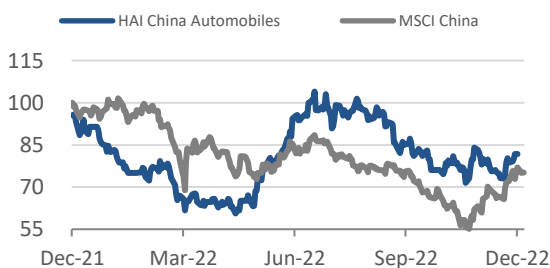
**集中度维持高位，行业格局持续优化。**2022年1-11月，全球动力电池装车量CR5和CR3市场份额分别为77.2%和65.0%。其中宁德时代与比亚迪分别占比35.8%/13.1%，居一、三位。根据中国汽车动力电池产业创新联盟统计，2022年1-11月我国共计51家动力电池企业实现装车配套，较2021年同期减少3家，CR3/CR5/CR10装车量分别为220/245/254GWh，占总装车量比85.0%/94.7%/98.1%。

**正极材料-三元锂与磷酸铁锂份额分化：**2022年磷酸铁锂体系从微型车垂直向上加速覆盖A级与B级车，在有效提升性价比的同时，促进A级电动车销量扩张。根据电池中国统计，至2025年国内厂商正极材料扩产规模近1,000万吨，对应超过4TWh动力电池规模，其中磷酸铁锂占比超过80%。我们认为，正极材料规划产能可以满足未来3-5年装机需求，正极材料或出现高端产能紧缺，低端产能过剩情况。

**负极材料-石墨化供需紧张缓解：**2022年负极产能投资扩产加速，根据百川盈孚统计，2021-2022中国负极新建产能合计扩张超过947万吨。考虑到负极材料扩产周期较长，我们预计2023年负极材料产能将迎来集中释放，负极材料价格或进入下降通道。

**隔膜-延续供需紧平衡：**受限于产能建设周期与设备供应，2022年隔膜行业主要新增产能集中于2022Q4、2023Q1释放，动力电池隔膜保持紧平衡状态，据百川盈孚，2022年国内隔膜产量将突破115亿平方米。

**电解液-上游原材料增产推动价格回落：**2022Q2开始随着各头部企业大批量投产六氟磷酸锂、VC、DMC等原材料，电解液价格快速回落。头部企业对原材料把控能力更强，产能利用率更高，行业集中度进一步提升。



资料来源：Factset, HTI

#### Related Reports

特斯拉全系国产车型降价，有望垂直延伸市场份额（Tesla cuts starting prices for China-made models to boost Q4 demand）（25 Oct 2022）  
英伟达发布车芯 Thor，引领汽车智能芯片革新浪潮（Nvidia Releases Drive Thor, One Chip to Rule All Software-Defined Vehicles）（21 Sep 2022）  
2022 华为秋季新品发布会：问界 M5 EV 全面对标特斯拉 Model Y，鸿蒙生态全场景覆盖智慧生活（Huawei-backed AITO launches first all-electric model M5 EV to take on Tesla Model Y）（7 Sep 2022）

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**电池材料体系与结构技术变化催生从 0 到 1 新机遇。**随着行业成熟度不断提升，动力电池技术革新成为驱动行业发展的核心因素，主要通过现有材料体系的迭代升级和结构创新推动能量密度提升，实现降本增效。我们认为，中期铁锂与三元仍然是材料体系的主流路线，并将在成分方面不断优化改良，长期来看低成本+高能量密度发展趋势较为明确。

**风险提示。**新能源车销量不及预期，新技术应用进度不及预期，原材料价格上涨，贸易摩擦加剧等。

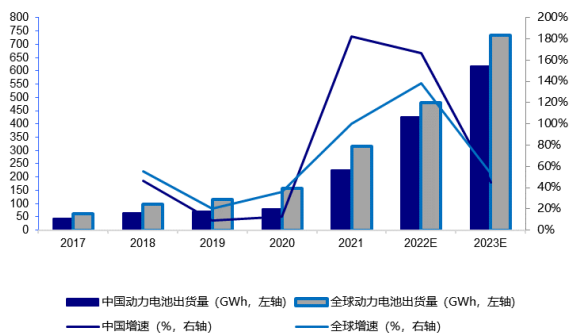
## 动力电池：全球电动化加速，材料技术创新带动产业结构升级

### 1. 受下游新能源车需求拉动，动力电池产销维持高景气

**供给端：**受下游新能源汽车高景气影响，2021 年全球动力电池出货量达到 296.8GWh，步入快速增长阶段。2022 年 1-11 月，我国动力电池累计产量 489.2GWh，同增 160%。其中三元电池累计产量 190.0GWh，占总产量 38.8%，累计同增 131%；磷酸铁锂电池累计产量 298.5GWh，占总产量比 61.0%，累计同增 183%。锂电企业积极推进产能建设，根据高工锂电统计，2022 年全球动力电池产能超过 1,000 GWh，正式步入 TWh 时代。我们认为，2023 年在行业增速基础上，叠加单车带电量提升趋势，锂电池出货量增速将维持高于行业。

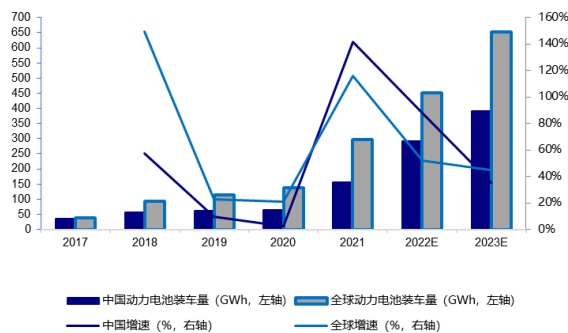
**需求端：**2022 年 1-11 月，全球动力电池装机量约 436 GWh，同增 78%；我国动力电池累计装车量 258.5GWh，同增 102%。其中三元电池累计装车 99.0GWh，占总产量比 38.3%，累计同增 57%；磷酸铁锂电池累计装车 159.1GWh，占总产量比 61.5%，累计同增 146%。全球电动车市场除中国、欧洲、美国外，其他国家和地区新能源渗透率低于 2%，市场空间仍然广阔。我们认为，2023 年美国市场有望在 IRA 法案补贴驱动下实现渗透率快速提升，本土产业链配套不足的情况下催生头部企业出海建厂机遇，中期技术储备和成本控制能力优秀的龙头企业有望受益于美国本土产能缺口，进一步提升全球份额与盈利弹性。

图表 1 中国与全球动力电池出货量



资料来源：中国汽车动力电池产业创新联盟，SNE Research，海通国际

图表 2 中国与全球动力电池装车量

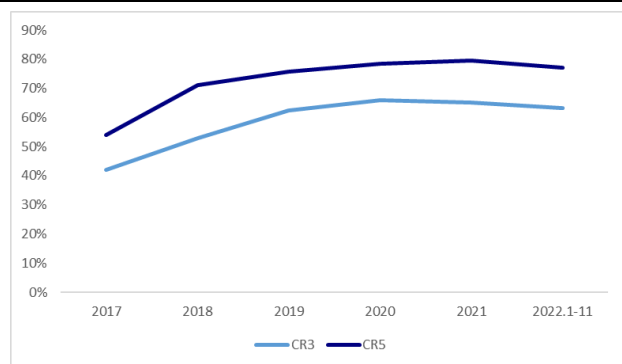


资料来源：前瞻产业研究院，海通国际

### 2. 集中度维持高位，行业格局持续优化

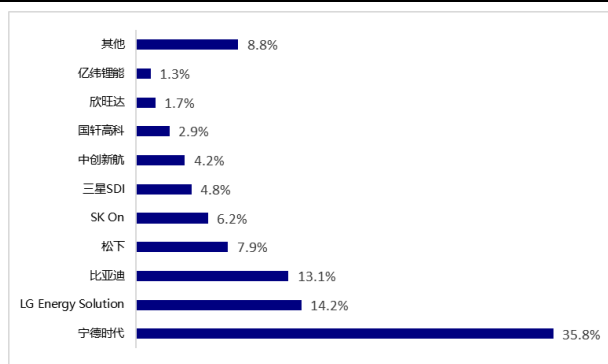
**全球动力电池集中度较高。**根据 SNE Research 数据，近五年全球动力电池行业集中度总体呈上升趋势。2022 年 1-11 月，全球动力电池装车量 CR5 市场份额 77.2%，CR3 65.0%。其中宁德时代与比亚迪分别占比 35.8%/13.1%，居一三位。根据中国汽车动力电池产业联盟统计，2022 年 1-11 月我国共计 51 家动力电池企业实现装车配套，较 2021 年同期减少 3 家，CR3/CR5/CR10 装车量分别为 220/245/254GWh，占总装车量比 85.0%/94.7%/98.1%。

图表3 全球动力电池市场集中度



资料来源: SNE Research, 海通国际

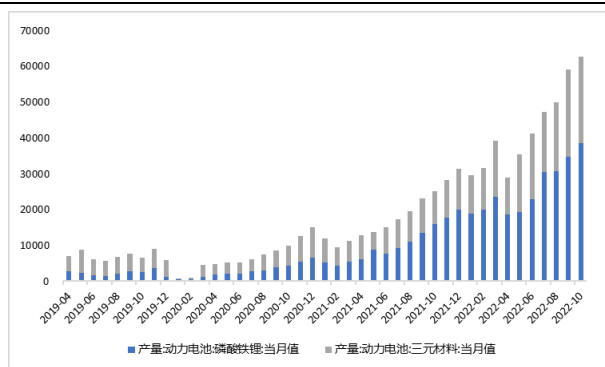
图表4 2022.1-11月全球动力电池市场份额



资料来源: SNE Research, 海通国际

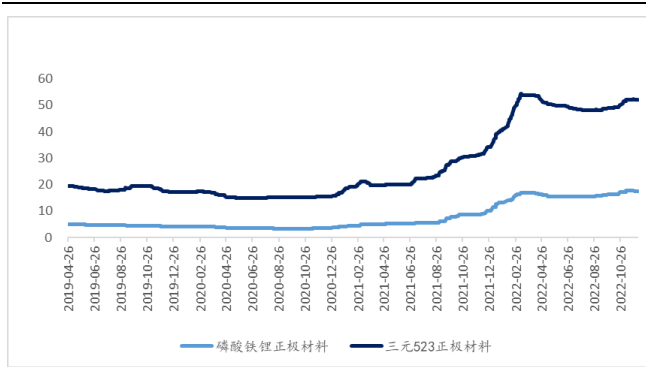
**正极材料-三元与磷酸铁锂份额分化。**受原材料价格上涨影响,主机厂为降低成本压力,转而采用铁锂电池,通过CTP等技术实现提升整包能量密度提升,缩小与三元电池的差距。2022年磷酸铁锂体系从微型车垂直向上加速覆盖A级与B级车,有效提升性价比,促进A级电动车销量扩张。根据电池中国统计,至2025年国内厂商正极材料扩产规模近1,000万吨,对应超过4TWh动力电池规模,其中磷酸铁锂占比超过80%。我们认为,正极材料规划产能可以满足未来3-5年装机需求,正极材料或出现高端产能紧缺,低端产能过剩情况。

图表5 中国正极材料出货量(MWh)



资料来源: Wind, 海通国际

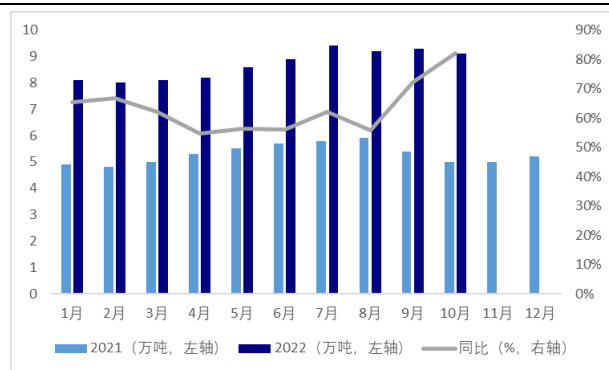
图表6 正极材料价格变动(万元/吨)



资料来源: Wind, 海通国际

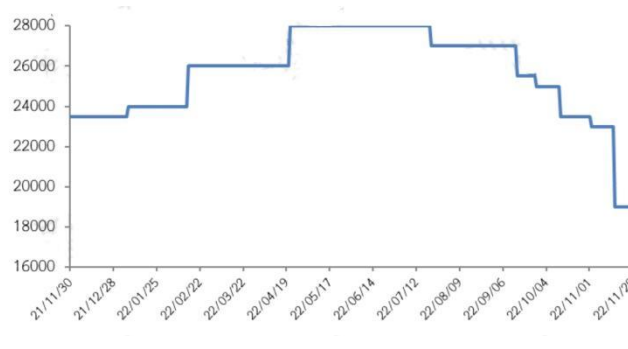
**负极材料-石墨化供需紧张缓解。**2021年受“能耗双控”影响,石墨化存量产能开工率与新增产能受限,成为影响负极材料产量的主要瓶颈。2022年负极产能投资扩产加速,根据百川盈孚统计,2021-2022中国负极新建产能合计扩张超过947万吨。考虑到负极材料扩产周期较长,一体化项目审批周期6-12个月,建设周期约6个月,设备调试3-6个月,预计2023年负极产能将迎来集中释放,负极材料价格或进入下降通道。

图表7 中国负极材料产量



资料来源: 百川盈孚, 海通国际

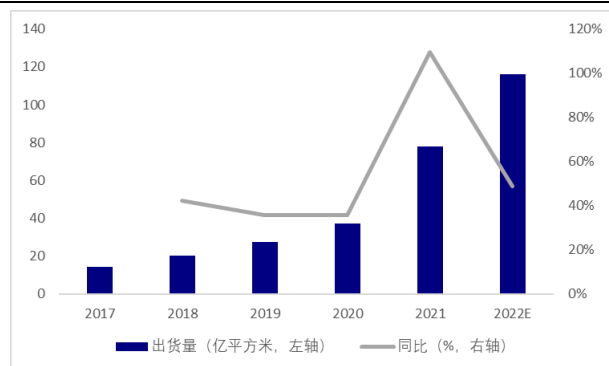
图表8 石墨化代加工费用 (元/吨)



资料来源: 百川盈孚, 海通国际

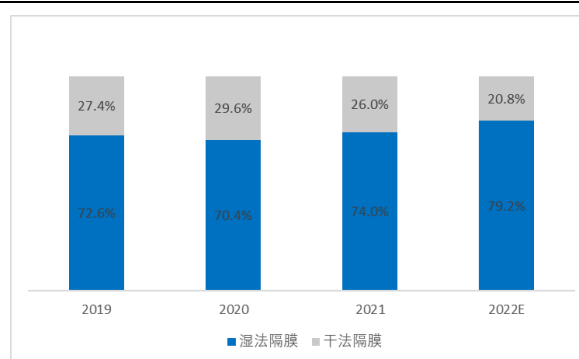
**隔膜-延续供需紧平衡。**受限于产能建设周期与设备供应, 2022 年隔膜行业主要新增产能集中于 2022Q4、2023Q1 释放, 动力电池隔膜保持紧平衡状态, 据百川盈孚, 2022 年国内隔膜产量将突破 115 亿平方米。2019 年以来, 湿法隔膜占隔膜总出货量超过 70%, CR5 市场份额约 90%, 集中度较高。

图表9 中国锂电隔膜出货量



资料来源: 百川盈孚, 海通国际

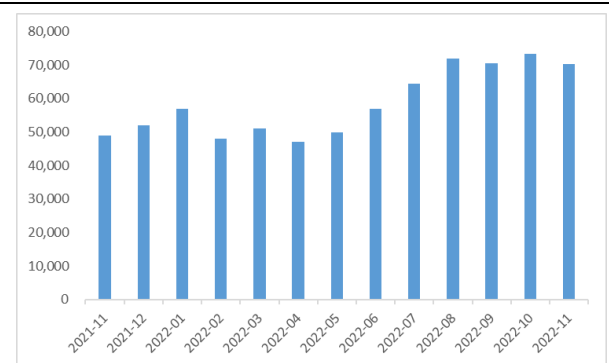
图表10 中国湿法、干法隔膜出货量占比



资料来源: 百川盈孚, 海通国际

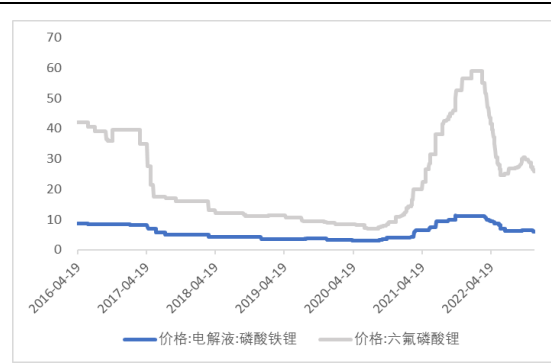
**电解液-上游原材料增产推动价格回落。**2022Q2 开始随着各头部企业大批量投产六氟磷酸锂、VC、DMC 等原材料, 电解液价格快速回落。头部企业对原材料把控能力更强, 产能利用率更高, 行业集中度进一步提升。

图表11 电解液月度产量 (吨)



资料来源: 百川盈孚, 海通国际

图表12 六氟磷酸锂与电解液价格走势 (万元/吨)

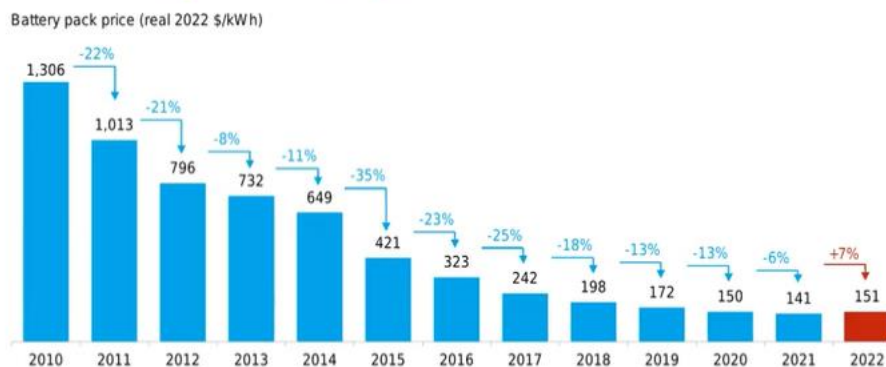


资料来源: 百川盈孚, 海通国际

锂盐价格仍是影响动力电池产业链成本控制的核心因素。2022 年正极材料占动力电池整体成本已超过 40%，原材料成本是正极和负极的主要成本，占比分别为 90%/86%。根据 BloombergNEF 预测，2023 年可用于新能源汽车的锂供给约 90 万吨 LCE，同比增长 47.5%，行业供需比逐步改善，考虑到中游电池厂商加速扩产，锂供应持续延续紧张状态，中期碳酸锂价格取决于供给端达产情况。

图表 13 2022 全球锂电池产业调研价格为 151 美元/KWh

### Lithium-ion battery price survey results: volume-weighted average



资料来源：BloombergNEF，海通国际

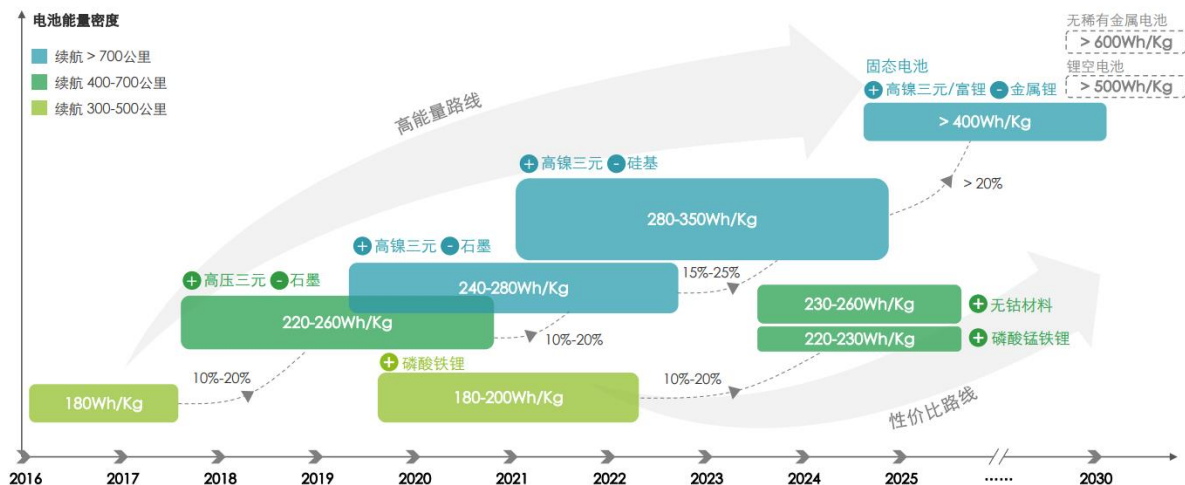
### 3. 电池材料体系与结构技术变化催生从 0 到 1 新机遇

随着行业成熟度不断提升，动力电池技术革新成为驱动行业发展的核心因素，主要通过现有材料体系的迭代升级和结构创新推动能量密度提升，实现降本增效。我们认为，中期铁锂与三元仍然是材料体系的主流路线，并将在成分方面不断优化改良，长期来看低成本+高能量密度发展方向较为明确。

**材料体系：**正、负极材料决定能量密度，其中正极材料的突破最有可能带来动力电池能量密度大幅提升。

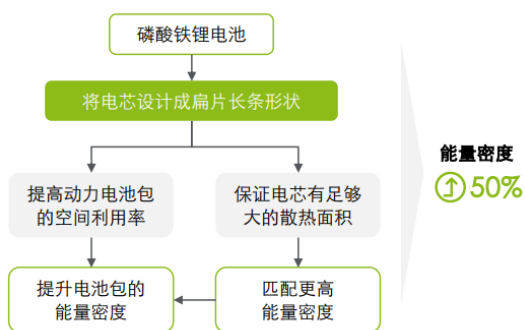
**结构创新：**在已实现成熟应用的锂电池材料体系下，电芯、模组、封装方式等结构上的改进和精简有助提升电池的系统性能，如 4680 大圆柱电池、比亚迪刀片电池、宁德时代 CTP、CTC 技术等，结构革新是除材料迭代以外另一条重要的技术发展路径。

图表 14 化学与结构体系迭代是动力电池行业发展的核心驱动



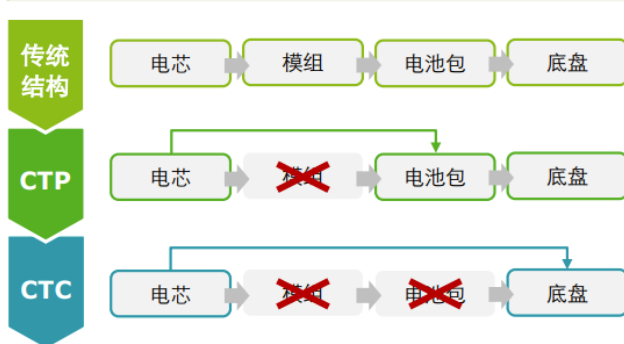
资料来源:《中国锂电行业发展报告》, 德勤, 海通国际

图表 15 刀片电池采用创新电芯形状与电池包内部空间排布



资料来源:《中国锂电行业发展报告》, 德勤, 海通国际

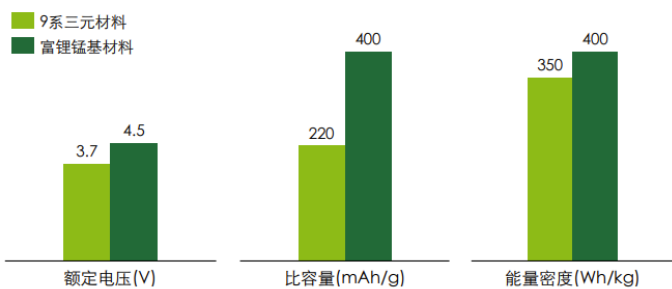
图表 16 集成化 CTC 可实现电池与电驱系统的结合



资料来源:《中国锂电行业发展报告》, 德勤, 海通国际

**正极材料-富锂锰基:** 富锂锰基材料属于固溶体材料, 优点为高电压下的尖晶石结构放电比容量达到 400mAh/g, 具有较高的能量密度, 单瓦时成本大幅低于三元高镍 30%-40%。富锂锰基正极材料商业化需克服高电压下电池循环、原材料配套问题等, 目前仍以中低压应用为主。

图表 17 富锂锰基具备成为新一代正极材料的特性



资料来源：《中国锂电行业发展报告》，德勤，海通国际

图表 18 富锂锰基仍处于产业化初期

**应用制约**

- ① **首次库伦效率低**：富锂锰基正极材料在首次放电过程中造成较高不可逆的容量损失，影响电池的容量和循环性能。
- ② **能量衰减严重**：富锂锰基正极材料循环过程中晶粒表面化学反应和内部扩散的共同作用导致电压严重衰减，影响电池寿命。

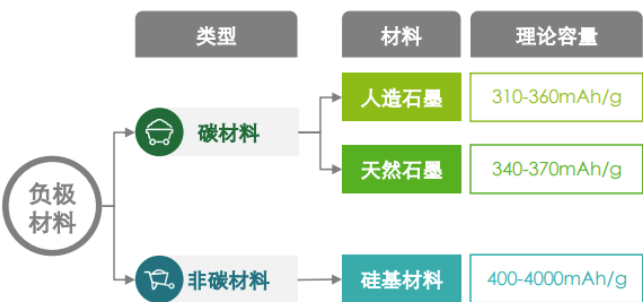
**产业化现状**

- 宁波富理公司率先开展富锂锰基正极材料产业化，北京当升、江特电机、容百科技、桑顿新能源等也有研发布局。
- FuLi 富理**：宁波富理电池材料科技有限公司是中科院宁波材料所动力电池工程实验室技术团队在2016成立的初创公司。
  - 重点开发用于长续航动力电池的新一代正极材料：**富锂锰基正极材料**和**硅碳复合负极材料**。
  - 目前已建成富锂锰基正极材料**中试生产线**，是全球唯一能批量供应高容量富锂锰基正极材料的企业。

资料来源：《中国锂电行业发展报告》，德勤，海通国际

**负极材料-硅基负极**：硅碳、氧化亚硅理论比容量最高可达 4,000mAh/g，是石墨材料 10 倍以上，并且可从各个方向提供锂离子嵌入和脱出通道，快充性能优异。硅基负极在嵌锂过程中体积膨胀、材料导电性不佳、循环性能等缺陷制约了商业化应用。目前，硅基负极主要采用掺杂的方式加入人造石墨中，其中硅碳负极采取纳米硅与石墨材料混合的方式，硅氧负极采用氧化亚硅与石墨材料复合。根据高工锂电统计，2022 年硅基负极渗透率不足 2%，市场潜力巨大。受益于大圆柱电池产业化加速，硅基负极趋势明确，有望带动粘结剂 PAA、补锂剂、碳纳米管粉体等新型材料的发展。

图表 19 硅基负极材料理论容量



资料来源：《中国锂电行业发展报告》，德勤，海通国际

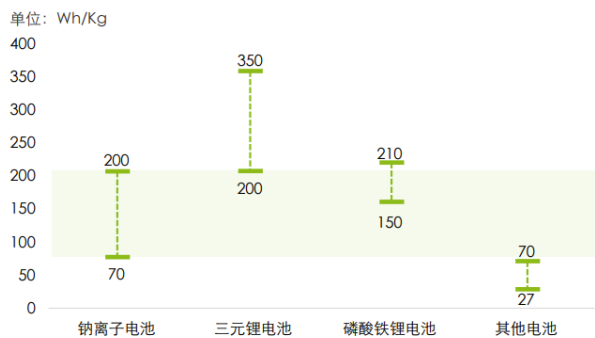
图表 20 硅基负极国内厂商与产业化进程

- 贝特瑞**
  - 于 2013 年实现硅基负极材料的产业化并批量销售，是国内最早量产硅基负极材料的企业之一。
  - 2022 年，公司公告拟在深圳市光明区投资建设年产 4 万吨硅基负极材料项目。
- 杉杉股份**
  - 硅碳负极材料已建成一条中试产线，开始逐步放量，但目前出货占比不高。
  - 高容量硅合金负极材料已产业化并已对宁德时代供货。
- 国轩高科**
  - 2016 年投建 5000 吨硅基负极材料项目。
  - 2021 年 1 月，210Wh/kg 软包磷酸铁锂电芯正式发布，并宣布首次在磷酸铁锂化学体系中成功应用硅负极材料。
- 璞泰来/紫宸科技**
  - 与中科院物理所合作建立中试车间，第二代硅基产品已具备产业化的基本条件；在濮阳还建立了氧化亚硅中试线。
  - 璞泰来全资子公司紫宸科技研发的硅碳负极材料系列可用于 3C 数码电池、储能电池、动力电池等。

资料来源：《中国锂电行业发展报告》，德勤，海通国际

**钠离子电池**：钠电池在能量密度、循环寿命、工作电压、热稳定性与安全性方面理论上接近磷酸铁锂电池，同时低温性能与自放电率更优，量产后的软碳钠离子电池材料成本相比磷酸铁锂有 30%-40% 的下降空间。目前，钠电池仍处于商业化探索与改良阶段，工程化设备、供应链配套尚未形成，产品性能、成本控制与应用场景有待进一步检验。钠电池由正极材料、负极材料、集流体、隔膜、电解液、壳体等部件组成。目前进展较快的正极路线是镍铁锰/铜铁锰和普鲁士化合物路线，负极材料采取碳基材料，电解液采用六氟磷酸钠，集流体可用铝箔替代。我们认为，在锂价维持高位情况下，钠电池有望率先在两轮车、低速电动车、电动工具、储能等场景率先落地应用，对铅酸电池形成有效替代。

图表 21 钠离子电池与锂离子电池能量密度对比



资料来源：《中国锂电行业发展报告》，德勤，海通国际

图表 22 钠电池具备成本、安全性等优势



资料来源：《中国锂电行业发展报告》，德勤，海通国际

## 风险提示

新能源车销量不及预期，新技术应用进度不及预期，贸易摩擦加剧等。

## APPENDIX 1

### Summary

#### **Driven by downstream demand for new energy vehicles, power battery production and sales maintain a high boom**

From January to November 2022, China's cumulative power battery output was 489.2 GWh, +160% YoY. Global power battery installed capacity is about 436 GWh, +78%YoY; China's cumulative installed capacity is 258.5 GWh, +102%YoY. Lithium enterprises are actively promoting capacity construction. According to Shenzhen Gaogong Industry Research, global power battery capacity will exceed 1,000 GWh in 2022, officially stepping into the TWh era. We believe that in 2023, based on the industry growth rate, superimposed on the trend towards higher charge carrying capacity per EV to enhance the growth rate of lithium battery shipments will continue to be higher than the industry growth rate.

#### **Concentration remains high, and the industry pattern continues to be optimized**

From January to November 2022, the global power battery installed CR5 and CR3 market share was 77.2% and 65.0%, respectively. CATL and BYD accounted for 35.8%/13.1%, ranking one and three, respectively. According to the China Automotive Power Battery Industry Innovation Alliance, from January to November 2022, 51 power battery enterprises in China realized the installation of supporting vehicles, three less than in the same period in 2021. The CR3/CR5/CR10 installation volume was 220/245/254GWh, accounting for 85.0%/94.7%/98.1% of the total installation volume.

**Cathode materials – differentiation of ternary lithium and lithium iron phosphate share:** In 2022, the lithium iron phosphate system is accelerating vertically upwards from micro cars to cover Class A and Class B cars, effectively improving the cost performance at the same time, promoting the expansion of A-class electric vehicle sales. According to CBEA, by 2025, domestic manufacturers' expansion scale of Cathode material will be nearly 10 million tons, corresponding to more than 4TWh power battery scale, of which lithium iron phosphate accounted for more than 80%. We believe that the planned production capacity of Anode materials can meet the installed demand in the next 3-5 years. There may be a shortage of high-end production capacity and excess capacity at the low end of cathode materials.

**Anode materials - graphitization supply and demand tension easing:** 2022 negative electrode capacity investment and expansion accelerated, according to Baiinfo, 2021-2022 China's negative electrode new production capacity expansion of more than 9.47 million tons in total. Considering the long expansion cycle of Anode materials, We expect to see a significant release of Anode material capacity by 2023, and the price of Anode materials may enter a downward channel.

**Separators - Continuation of the tight supply-demand balance.:** Limited by the capacity construction cycle and equipment supply, 2022 Power Battery Separators industry, the main new production capacity concentrated in 2022Q4, 2023Q1 release. Power Battery Separators to maintain a tight balance, according to Baiinfo, 2022 domestic diaphragm production will exceed 11.5 billion square meters.

**Electrolyte - Increased upstream raw materials production capacity drives prices back down.:** onwards 2022Q2, with the head enterprises' mass production of lithium hexafluorophosphate, VC, DMC, and other raw materials, electrolyte prices fell back quickly. The head enterprises have stronger control over raw materials, higher capacity utilization and further increase the concentration of the industry.

#### **Changes in battery material system and structure technology create substantial new opportunities**

As the industry's maturity continues to rise, power battery technology innovation has become the core factor driving the development of the industry, mainly through the iterative upgrading of existing material systems and structural innovation to promote energy density and achieve cost reduction and efficiency. We believe that lithium iron and ternary are still the mainstream material systems in the medium term and will continue to optimize and improve the composition. The long-term development trend of low-cost + high energy density is clear.

### Risks

Ev's sales are not as expected; New technology application progress is not as expected; Raw material price increase; Trade friction intensifies, etc.

## 附录 APPENDIX

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**优于大市**, 未来 12-18 个月内预期相对基准指数涨幅在 10%以上, 基准定义如下

**中性**, 未来 12-18 个月内预期相对基准指数变化不大, 基准定义如下。根据 FINRA/NYSE 的评级分布规则, 我们会将中性评级划入持有这一类别。

**弱于大市**, 未来 12-18 个月内预期相对基准指数跌幅在 10%以上, 基准定义如下

各地股票基准指数: 日本 – TOPIX, 韩国 – KOSPI, 台湾 – TAIEX, 印度 – Nifty100, 美国 – SP500; 其他所有中国概念股 – MSCI China.

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**Analyst Stock Ratings**

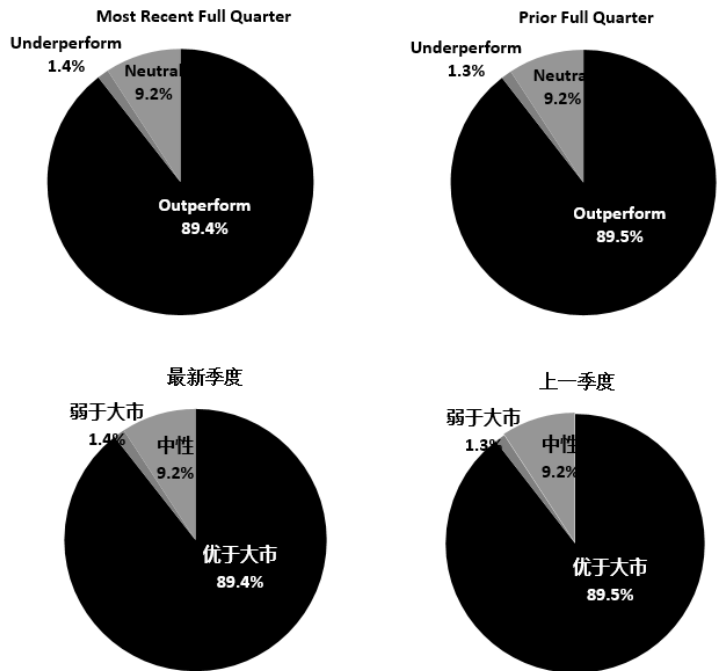
**Outperform:** The stock's total return over the next 12-18 months is expected to exceed the return of its relevant broad market benchmark, as indicated below.

**Neutral:** The stock's total return over the next 12-18 months is expected to be in line with the return of its relevant broad market benchmark, as indicated below. For purposes only of FINRA/NYSE ratings distribution rules, our Neutral rating falls into a hold rating category.

**Underperform:** The stock's total return over the next 12-18 months is expected to be below the return of its relevant broad market benchmark, as indicated below.

**Benchmarks for each stock's listed region are as follows: Japan – TOPIX, Korea – KOSPI, Taiwan – TAIEX, India – Nifty100, US – SP500; for all other China-concept stocks – MSCI China.**

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	优于大市	中性 (持有)	弱于大市
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投资银行客户*	5.5%	6.8%	4.5%

\*在每个评级类别里投资银行客户所占的百分比。

上述分布中的买入, 中性和卖出分别对应我们当前优于大市, 中性和落后大市评级。

只有根据 FINRA/NYSE 的评级分布规则, 我们才将中性评级划入持有这一类别。请注意在上表中不包含非评级的股票。

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中性, 未来 12-18 个月内预期相对基准指数变化不大, 基准定义如下。根据 FINRA/NYSE 的评级分布规则, 我们会将中性评级划入持有这一类别。

卖出, 未来 12-18 个月内预期相对基准指数跌幅在 10%以上, 基准定义如下

各地股票基准指数：日本 – TOPIX, 韩国 – KOSPI, 台湾 – TAIEX, 印度 – Nifty100; 其他所有中国概念股 – MSCI China.

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	Outperform	Neutral (hold)	Underperform
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IB clients*	5.5%	6.8%	4.5%

\*Percentage of investment banking clients in each rating category.

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