



## 什么是固态电池，为什么我们需要它们？

### What are solid-state batteries and why do we need them?

#### 中文导读：

含有固态电解质的电池在理论上有许多优点，但廉价制造这种电池的技术却一直难以实现。

Toyota says it has made a breakthrough that will allow “game-changing” solid-state batteries to go into production by 2028. These devices will be lighter and more powerful than current batteries, giving electric cars a range of 1200 kilometres with a charging time of just 10 minutes. But should we pin our hopes on them?

丰田公司表示，该公司已取得突破性进展，将在 2028 年之前投产 “改变游戏规则” 的固态电池。这些设备将比现有电池更轻、更强大，使电动汽车的续航里程达到 1200 公里，充电时间仅需 10 分钟。但是，我们应该寄希望于它们吗？

#### 重点词汇：

**breakthrough:** n. 突破；重大进展

**solid-state:** adj. 固态的

**battery:** n. 电池

**game-changing:** adj. 改变游戏规则的；具有重大影响的



**production:** n. 生产；制造

**lighter:** adj. 更轻的

**powerful:** adj. 更强大的

**electric cars:** 电动汽车

**range:** n. 范围；距离

**charging time:** 充电时间

**pin one's hopes on:** 寄希望于

 **固定搭配:**

**go into production:** 开始生产

The new model will go into production next year. (新型号将于明年开始生产。)

**a range of:** 一系列；一种选择

We offer a range of products to meet your needs. (我们提供一系列的产品以满足您的需求。)

**pin one's hopes on:** 寄希望于

I wouldn't pin my hopes on winning the lottery. (我不会寄希望于中彩票。)

### What are solid-state batteries?

什么是固态电池？

The lithium-ion batteries that we rely on in our phones, laptops and electric cars have a liquid electrolyte, through which ions flow in one direction to charge the battery and the other direction when it is being drained. Solid-state batteries, as the name suggests, replace this liquid with a solid material.

我们的手机、笔记本电脑和电动汽车中使用的锂离子电池有一种液体电解质，离子在电池充电时通过电解质沿一个方向流



动，而在电池放电时则朝另一个方向流动。固态电池，顾名思义，就是用固体材料代替这种液体。

### 重点词汇：

**lithium-ion battery:** 锂离子电池

**rely on:** 依赖；依靠

**laptop:** 笔记本电脑

**liquid:** n. 液体

**electrolyte:** 电解质

**replace:** v. 取代

**solid material:** 固态材料

### 固定搭配：

**flow in one direction:** 在一个方向流动

The river's current flows in one direction. (这条河的水流一直向一个方向流动。)

A lithium-ion battery will typically have a graphite electrode, a metal oxide electrode and an electrolyte of lithium salt dissolved in some sort of solvent. In solid-state batteries, you might find one of a whole host of promising materials replacing the lithium, including ceramics and sulphides.

锂离子电池通常包括石墨电极、金属氧化物电极和溶解在某种溶剂中的锂盐电解液。在固态电池中，你可能会发现一系列有望替代锂的材料，包括陶瓷和硫化物。

### 重点词汇：

**typically:** adv. 通常；一般地

**graphite electrode:** 石墨电极

**metal oxide electrode:** 金属氧化物电极

**lithium salt:** 锂盐

**dissolved:** adj. 溶解的

**solvent:** 溶剂

**host:** n. 大量；众多



**promising:** adj. 有前途的；有潜力的

**ceramics:** 陶瓷

**sulphides:** 硫化物

 **固定搭配:**

**a whole host of:** 大量的；众多的

There's a whole host of restaurants in this neighborhood. (这个地方有大量的餐馆。)

**Why is ditching a liquid electrolyte useful?**

放弃液态电解质有何好处？

Although some solid-state battery prototypes still use it, one big advantage of cutting out lithium is that it is in short supply and environmentally damaging to mine. The shortage is only likely to worsen as the world shifts away from fossil fuels towards using more renewable electricity stored in batteries.

尽管一些固态电池原型仍在使用锂，但去掉锂的一个主要好处是锂短缺，且开采对环境有害。随着世界从化石燃料转向使用更多存储在电池中的可再生能源，这种短缺只会进一步恶化。

 **重点词汇:**

**prototype:** n. 原型；样机

**cut out:** 切除；剔除

**short supply:** 供应短缺

**environmentally:** adv. 有关环境方面

**mine:** v. 开采

**shortage:** n. 短缺

**worsen:** v. 恶化

**shift:** v. 转移

**fossil fuels:** 化石燃料



**renewable electricity:** 可再生电力

 **固定搭配:**

**in short supply:** 供应短缺

Face masks are currently in short supply due to high demand. (口罩目前供应短缺, 因为需求很大。)

**shift away from:** 转向; 改变

We need to shift away from fossil fuels to reduce carbon emissions. (我们需要转向可再生能源, 以减少碳排放。)

 **长难句分析:**

总的来说, 这个句子强调了去除锂的一个主要优势, 即锂供应短缺和对环境的矿业损害。随着全球能源转型的加速, 这一短缺问题可能会进一步恶化。句子结构清晰, 用于说明原因和趋势:

1. "**Although some solid-state battery prototypes still use it**": 这个从句引入了一个条件, 说明尽管一些固态电池的原型仍在使用锂, 但这并不是主要关注点。该从句中的 "it" 指代锂。
2. "**one big advantage of cutting out lithium**": 这是主句的一部分, 说明了去除锂的一个重要优势。这是一个名词性短语, 其中 "cutting out" 表示去除或停止使用。
3. "**is that it is in short supply**": 这部分进一步解释了为什么去除锂具有优势。它指出锂供应短缺, 即锂的供应量不足。这是一个主系表结构, 其中 "is" 是谓语动词, 而 "that it is in short supply" 是主语的补充说明。
4. "**and environmentally damaging to mine**": 这个短语提供了另一个原因, 即开采锂对环境有害。这是一个并列连词结构, 将两个原因并列在一起。
5. "**The shortage is only likely to worsen**": 这是一个独立主格结构, 指出供应短缺可能会进一步恶化。这里的 "The shortage" 指代锂的短缺。
6. "**as the world shifts away from fossil fuels towards using more renewable electricity stored in batteries**": 这部分进一步解释了为什么供应短缺可能会恶化。它描述了全球能源转型的趋势, 即向更多储存



在电池中的可再生电力转移，避免使用化石燃料。这是一个主从复合句，其中 "as" 引导时间状语从句，描述了条件，而主句部分说明了趋势。

There are also technical advantages to solid-state batteries, as well as logistical and economic ones. Removing the liquid electrolyte makes batteries less susceptible to fires, for example. And while conventional lithium batteries quickly charge up to 80 per cent of their capacity, they charge slowly from there to 100 per cent. Solid-state batteries can be fully charged more quickly.

固态电池还具备技术、物流和经济上的优势。例如，去除液体电解质使电池不易着火。虽然传统锂电池可以快速充电至 80% 的电量，但从 80% 充电到 100% 的速度却很慢。而固态电池可以更快充满电。

#### 重点词汇：

**technical advantage:** 技术优势

**logistical:** adj. 后勤的；后勤学的

**economic:** adj. 经济的

**susceptible to:** 易受...影响的

**conventional:** adj. 传统的

**charge up to:** 充至

**capacity:** 容量

**fully charged:** 充满电的

#### 固定搭配：

**charge up to:** 充至

The electric car can charge up to 80% in just 30 minutes. (这辆电动汽车只需 30 分钟就能充至 80%。)

**fully charged:** 充满电的

Please unplug the phone once it's fully charged. (一旦手机充满电，请拔掉充电器。)



Crucially, though, solid electrolytes are less dense, so a solid-state battery can be smaller and lighter than its lithium-ion competitor. This could, in turn, make electric cars smaller and lighter, or give them a greater range for the same size and weight. The increased energy density and lower weight could even make electric aircraft a viable proposition.

但关键在于，固态电解质密度较低，因此固态电池可以比锂离子电池更小更轻。这可能使电动汽车变得更小更轻，或者在相同尺寸和重量下提供更长的续航里程。提高的能量密度和减轻的重量甚至可能使电动飞机成为可能。

#### 重点词汇：

**crucially:** adv. 非常重要地

**less dense:** 密度较小

**smaller:** adj. 更小的

**lighter:** adj. 更轻的

**competitor:** 竞争对手

**greater:** adj. 更大的

**range:** 范围；距离

**increased:** adj. 增加的

**energy density:** 能量密度

**viable:** adj. 可行的

**proposition:** 提案；建议

#### How far away are they?

距离实际应用还有多远？

Solid-state batteries are nothing new – solid electrolytes were created in the 1800s by Michael Faraday, and they are currently used in medical



implants. But a technique to manufacture them cheaply has been elusive.

固态电池并不是什么新鲜事物——19 世纪迈克尔·法拉第 (Michael Faraday) 发明了固态电解质，它们目前用于医疗植入物。但廉价制造它们的技术一直难以实现。

### 重点词汇：

**nothing new:** 不是新事物

**medical implants:** 医疗植入物

**technique:** 技术

**manufacture:** v. 制造

**cheaply:** adv. 便宜地

**elusive:** adj. 难以捉摸的

The obvious benefits have seen car companies pouring cash into research. Ford and BMW have invested in a company called Solid Power that has previously said it will manufacture enough cells for 800,000 cars a year by 2028, while Mercedes-Benz has put money into another firm called Factorial Energy.

显而易见的好处让汽车厂商纷纷投入大量资金进行研究。福特和宝马投资了一家名为 Solid Power 的公司，该公司曾表示，到 2028 年，每年生产的电池将足够 80 万辆汽车使用，而梅赛德斯-奔驰则向另一家名为 Factorial Energy 的公司投入了资金。

### 重点词汇：

**obvious:** adj. 明显的

**benefit:** n. 好处

**pouring cash into:** 大量投资

**research:** n. 研究

**Ford:** 福特 (汽车制造公司)

**BMW:** 宝马 (汽车制造公司)





**invest in:** 投资

**manufacture:** v. 制造

**cell:** 电池

**Mercedes-Benz:** 奔驰 (汽车制造公司)

**put money into:** 投资

**firm:** 公司

Toyota's claims come after signing a deal earlier this month with Japanese petroleum company Idemitsu Kosan, which says it has been working on a sulphide solid electrolyte. The companies hope to start manufacturing a solid-state battery for cars in either 2027 or 2028, with production ramping up at a later date.

丰田在本月早些时候与日本石油公司出光兴产签署了一项协议后发表了上述声明，该公司表示一直在研究硫化物固体电解质。两家公司希望在 2027 年或 2028 年开始生产汽车固态电池，随后逐渐增加产量。

#### 重点词汇：

**claim:** n. 声称；主张

**sign a deal:** 签署协议

**petroleum:** n. 石油，原油

**working on:** 从事；研究

**sulphide:** 硫化物

**solid electrolyte:** 固态电解质

**manufacturing:** n. 制造；生产

**ramp up:** 迅速增加

#### 固定搭配：

**sign a deal:** 签署协议

The two companies are signing a deal to collaborate on a new project. (这两家公司正在签署协议合作新项目。)



Results from industry are less likely to be transparently published because of industrial rivalry, but academia has also had its fair share of success. Earlier this year, a team at the Chinese Academy of Sciences in Beijing managed to recharge a solid-state lithium-sulphur battery 1400 times, proving that these types of devices can have a long lifespan.

由于产业竞争，行业内的研究成果不太可能被公开透明地发布，但学术界也取得了一定的成功。今年早些时候，北京中国科学院的一支研究团队成功地对固态锂硫电池进行了 1400 次充电，证明这类设备可以具有较长的使用寿命。

#### 重点词汇：

**industry:** n. 工业

**less likely:** 不太可能

**transparently:** adv. 透明地

**industrial rivalry:** 工业竞争

**academia:** n. 学术界

**fair share:** 相当的份额

**recharge:** v. 充电

**lithium-sulphur battery:** 锂-硫电池

**long lifespan:** 长寿命

#### 固定搭配：

**less likely to be:** 不太可能

It's less likely to be a problem in the future. (这在未来不太可能成为问题。)

**fair share of success:** 相当的成功

He had his fair share of success in the business world.  
(他在商界取得了相当的成功。)

NASA has also developed a battery made of solid, stacked cells of sulphur and selenium, which it



says can cut battery weight by up to 40 per cent while also tripling the energy density.

NASA 还开发了一种由硫和硒固体堆叠电池制成的电池，并称这种电池可以将电池重量减轻 40%，同时还能将能量密度提高两倍。

#### 重点词汇：

**develop:** v. 开发

**stacked cells:** 堆叠电池

**sulphur:** 硫

**selenium:** 硒

**battery weight:** 电池重量

**energy density:** 能量密度

**tripling:** adj. 三倍的

But these bold claims haven't yet translated into real-world products. For now, Toyota's announcement puts it on a growing list of companies betting on solid-state battery technology. Time will tell which company will get there first and how much of a boost new battery designs can offer.

但这些大胆的宣称尚未转化为实际产品。就目前而言，丰田的声明使其成为越来越多押注固态电池技术的公司之一。时间会告诉我们哪家公司将率先实现这一目标，以及新的电池设计能提供多大的提升。

#### 重点词汇：

**bold:** adj. 大胆的

**announcement:** n. 公告；声明

**betting on:** 押注于

**boost:** n. 提升；增加

