



德国 颁布电动汽车新法鼓励电动汽车上路

Germany Issued the new law for electric vehicles, encourage electric vehicles running on the road

德国多年来一直坚持的目标是，到2020年电动车保有量超过100万辆。去年，默克尔总理重申该目标，并表示在该领域跨境合作非常重要。9月24日，德国通过一项关于电动汽车的新法律，目的在于提高德国全境电动汽车的使用率。新法律预计将于2015年生效，并于2030年6月30日失效。据悉，目前已经启动欧盟告知程序。

颁布电动车新法

这部新法律规定：第一、德国政府将给予电动汽车驾驶者一定的补贴，电动汽车驾驶者还将拥有进入限制区域的权利；第二、电动汽车充电站将为电动汽车预留一定的停车位，在其他的停车区域电动汽车也可以免费停车；第三、为便于识别电动汽车，电动汽车的牌照将与普通汽车的牌照区别开来，电动汽车的牌上将有特殊标识以便于交警识别；第四、德国地方政府（特别是空气与噪音污染敏感地区的政府）可以自主为电动汽车设置专门的电动汽车道，也可以在情况准许的情况下，准许有特殊标记的电动汽车使用公交车道。

文/ 克里特 Article/Crete

Over the years Germany has always insisted that the goal is to make the inventory of electric vehicle has more than 1 million cars by 2020. Last year, chancellor Angela Merkel reiterated this goal, and she said it was very important in cross-border cooperation in this field. On September 24, Germany has issued a new law for electric vehicle, the purpose was to improve the utilization rate of the German national electric vehicles. The new law is expected to take effect in 2015 and expire in June 30, 2030. It is understood that currently has begun to start the informing program.

Promulgated the new laws for Electric vehicles

The new law regulates: firstly, the German government will give a certain subsidy to the electric vehicle driver, the electric vehicle driver will also have the right to enter the restricted area; Secondly, the charging station will provide a certain parking space for the electric vehicle, will be provided free parking space in the charging stations; Thirdly, for ease of identification electric vehicles, the license plate of electric vehicle will distinguish from the ordinary car license plate, electric vehicle license plate will have a special logo for easy recognized by the traffic police; Fourthly, Germany local governments (especially sensitive to noise and air pollution region government) can be set independently special electric vehicle lane for electric vehicle, can also be in situations where conditions permit, permit to use the bus lanes if the electric vehicle has a special mark. However, it is not the mandatory provision, the traffic administrative

不过,这并非强制性条款,德国各地交通管理部门可结合当地交通状况自行决定。适用该法律的车辆主要是电池电动车、燃料电池车以及部分可充电式混合动力汽车。

鼓励电动车上路

德国政府一向鼓励发展电动汽车,2012年乘用车销量308万辆,其中只有不到3,000辆为电动车。2013年,欧洲电动车销量前四名国家分别为荷兰2.87万辆、法国1.5万辆、挪威0.87万辆,德国0.68万辆排名第四。2014年车企将至少有17款电动车投产并上市销售,2015年还将另有12款上市。未来3-4年内,德国汽车行业将向替代性汽车动力系统投资120亿欧元,约合155.2亿美元。车辆电气化将不再只是憧憬,而是现实。

德国交通部长亚历山大·多布林特表示:“基于新法律的颁布,我们为电动汽车的使用者提供了一系列的优惠政策。电动汽车的专属标签使每个人能够轻松的识别。同时,随着市场上可选的电动车类型的增多,道路上可见的电动车也将越来越多,电动车的销售将持续增长。但是,对于专属车道以及免费停车等相关政策的具体实施,各个地方有根据当地情况自主规定的权力。”

德国联邦环境部长芭芭拉·亨迪克斯表示,这项新法律授予德国地方政府在促进电动汽车使用政策方面一定的自主权,这将对改善环境起到一定的促进作用。

得到汽车业支持

德国的汽车制造业对新法律表示支持。德国汽车工业协会总裁马提亚·魏斯曼表示:“我们希望这部法律能够尽快得到实施,这是德国电动车促进政策的第一步,而且是极为正确的第一步。”这部新法律将极大地推进德国电动汽车制造业的发展。电动汽车的特殊标识将使电动汽车更易于区分,公交车道的开放以及免费的停车区域将会使电动汽车对大众更加具有吸引力。这些新措施如果能够在全德国范围内得到推广,将会吸引更多的潜在消费群体。为了达到这个目标,需要德国联邦政府、不同的区域、城市之间对此新法律的协调运行。

德国交通论坛总裁托马斯·哈勒对新法律表示欢迎。他认为,这部法律的重要之处在于它向电动汽车制造业提供

department of the Germany can be combined with local traffic conditions to decide on their own. Shall be governed by the laws of the vehicle is mainly the battery electric vehicle, fuel cell vehicle and parts of rechargeable hybrid cars.

Encourage electric vehicles are running on the road

The Germany government always encourages to develop electric vehicles, the sales of passenger car in 2012 is 3.08 million, of which only less than 3000 are electric vehicles. In 2013, the European 4 top sales of electric vehicle countries were respectively, the Netherlands, 28700 cars, France, 15000 cars, Norway, 8700 cars, Germany, 6800 cars, range in the fourth place. In 2014, Car companies will put into production and sell at least 17 types of electric vehicles, also have another 12 types will be listed in 2015. The next three to four years, the Germany car industry will invest 12 billion euros to the alternative vehicle power system, about \$15.52 billion. Vehicle electrification will no longer just a vision, but a reality.

Transport minister Alexander Brian said, "based on the promulgation of the new law, we provide a series of preferential policies for electric vehicles users. The exclusive label of electric vehicle can be easily to identify. At the same time, along with the increased of optional electric vehicles on the market, there will be more and more electric vehicles are running on the road, the sales of electric vehicle will continue to grow. However, for the exclusive lanes and the concrete implementation of relevant policies such as free parking places, local government has the right to make the regulation according to the local situation."

Supported by the auto industry

Germany's auto manufacturing has expressed support for the new law. German automotive industry association President Matthias Wiseman said: "we hope that the law will be implemented as soon as possible, this is the first step on the German electric promotion policies, and is the first correct step." The new law will greatly promote the development of the electric vehicle manufacturing in Germany. Special logo will make electric vehicle to be recognized more easier. The open free of bus lanes and free parking areas will make electric vehicles become more attractive to the public. The new measures if they could be promoted in the whole Germany, that will attract more potential consumer groups. In order to achieve this goal, that will need the coordinate cooperation for the law with the German federal government, different regions and cities. German traffic BBS President Thomas Haller welcomed the new law. The importance of the law, he argues, is that it provides an opportunity to manufacturers to develop electric vehicles. In addition, if the law can be implemented, its contribution will be immeasurable to the market. After Two years later, people will find specific changes in the law it brings to the car market. The premise of implementation of these



了一个发展的机会。另外,如果这部法律能够得到贯彻实施,其对市场的贡献将是不可估量的。两年后,人们将会发现这部法律给汽车市场带来的具体变化。实施这些的前提是,国家、各地区及各个城市,有关电动汽车整体的销售指导能够尽快得以应用,这其中也包括更加优惠的税收政策以及个人购买电动汽车时贷款利率的降低。人们将会发现使用电动汽车将比使用燃油机动车更加的便宜。

受到反对者质疑

然而,德国消费者对电动车热度仍然未达到预期水平。德国ADAC俱乐部面向1,000名车主展开调查表明,德国车主较两年前对电动车质疑更多,并且不愿意采购电动车作为家庭的下一辆车。

新法也遭到德国联邦议会绿党阵营的反对。该党派发言人史蒂芬·库恩表示,“交通部长多布林特力推的新法律并不能应对目前面临的环境保护等多方面挑战,在电动车行业的指导方针方面,多布林特完全进入了歧途。正如他先前所做的,促进重型越野车以及运动型多功能车与电动发动机相结合的倡议,这些并不是减少燃料燃烧以及改善环境的有效措施。我们需要的是对所有的交通运输工具与可再生能源相结合,而不是仅仅是在小范围内。”

德国自然与生物多样性保护联盟总负责人利夫·米勒也持相似观点。他表示:“对电动汽车与混合动力汽车开放公交车道的做法证明法律的制定者对城市交通的流动缺乏根本性的认识。现在的实际情况是,越来越多的自行车骑行者已经被迫与公交车一同行驶在狭窄的范围内。根据政府的意图,一部限速在30公里/小时的电动汽车也将被准许行驶在这个狭窄的范围内,这是极为不安全的。我个人并不认为这部新法律能为电动车行业带来任何新的积极的改变。”

changes require the relative Selling guideline can be put into operation as soon as possible in every country, region and city, these countries, regions and cities, that including more preferential tax policies as well as lower lending rates for people to buy the electric vehicles. People will find that it will be more cheaper to use electric vehicle than use fuel vehicles.

Questioned by opponents

However

Germany consumers still haven't reached the expectation for electric vehicle. Germany's ADAC club had investigated to 1000 owners and shown that at the German car owners have questioned more about electric vehicles compared with two years ago, and not willing to purchase electric vehicles as the next family car.

The new law also opposed by the German federal parliament green camp. The party spokesman Steven Kuhn said, "transportation minister Brian recommended new law didn't cope with the challenges of environmental protection and other aspects, in terms of the electric vehicle industry guidelines, Brian has fully entered into the wrong way. As what he did before, promoted heavy off road vehicles and the initiative combination of sport utility vehicles and electric motor, this is not the effective measure to reduce fuel and to improve the environment. What we need is the combination of all the transportations and renewable energy, it is not only on a small scale." German union for conservation of nature and biodiversity head Livni Miller also takes a similar view. He said: "free open the bus lanes to electric vehicles and hybrid bus had proven that law makers are lack of understanding of the urban traffic flow. Now the reality is, more and more cyclists have been forced to drive with bus in narrow range. According to the government's intentions, a speed limit in 30 km/h electric vehicles will be allowed to drive in this narrow range, this is very unsafe. Personally, I don't think the new law will bring any new positive changes to the electric vehicle industry."



法国——开发旧电池储能充电站

French To develop old batteries energy storage charging stations

法国以布依格建筑公司为首的法国财团，包括汽车制造商雷诺、电气工程集团阿尔斯通和电缆制造商耐克森等联合开发推出利用旧电池建设新型充电系统，将旧动力电池变为电力储存库，在晚上储备谷电电能，白天逐步释放为电动车充电，可以缓解数十辆电动车同时充电给电网供电造成的压力。

巴黎常见的电动车自助租用体系的充电站，一般有4-5个充电插头，而电网水平仅仅相当于普通的家庭。在上班高峰期间，一个单位也会有几十名员工会同时有充电需求，对于建筑物的电网系统会造成压力，电力连接设备就亟待更新。新开发的充电系统将旧电池变为电力储存库，使其在晚上储存电能，白天逐步释放，缓解同时充电的压力。该项目预算为1300万欧元。（1欧元约为7.88元人民币）

雷诺电动车报废的锂离子电池是该系统的关键组成部分。锂电池如果失去20%-25%的充电容量，就无法继续作为动力电池使用，但却可用于存储电能的储能电池。雷诺出售电动汽车，租用车载电池，目前拥有和管理四个不同型号的4.7万枚电池。新的充电系统适用于所有品牌的电动汽车。目前，新充电站已经在布依格和雷诺两家公司进行试点，最终将销售给写字楼、校园等停车场。

这是一个很便宜的存储形式，目前谈论该系统的耗资还为时尚早，因为电池的成本已计算在报废的车辆上。充电站将像“乐高积木”一样模块化，使企业可以按照自己的需求修建。

汽车咨询公司IHS预计，2014年全球将生产21.7万辆电动汽车，预计占全球汽车总产量8770万辆的0.25%。

French consortium headed by Bouygues construction companies, including carmakers Renault, electrical engineering group, Alstom and cable manufacturers Nexon developed jointly launched with old construction new battery charging system, change the old repository power battery into electricity, electric power, reserve the valley electricity in the evening and gradually release for electric vehicle charging, can alleviate the electricity pressure for dozens of electric vehicles charging at the same time. The normal electric vehicles self

Rent charging station in Paris are generally have 4

5 charging sockets, but the grid electricity only equal to the household electricity. There will be tens of stuff charging at the time time when in the peak of using electricity, which will cause stress for the structure of the grid system, electrical connection equipment needs to be updated. New developed charging system will change the old batteries to power repository, to store the electricity in the evening, and release to daily use gradually, alleviate the pressure of the charging at the same time. The project budget is 13 million euros. One euro (about 7.88 yuan)

Renault's electric vehicle scrapping of lithium ion battery is a key part of the system. If Lithium battery lost 20% to 25% of charging capacity, it will not be able to continue as power battery, but it can be used to store electrical energy storage battery. Renault selling electric vehicles, rent the car battery, currently owns and manages four different models of 47000 pieces of batteries. New charging system applies to all brands of electric vehicles. At present, the new charging stations have been applied in Bouygues and Renault companies, will eventually sold to the parking lots of office buildings, and comprise etc.

This is a cheap form of storage, it is still too early to talk about the cost of the system at the moment, because the cost of the battery has been calculated on the scrapped vehicles. Charging station just like a "lego" modular, which makes the enterprise can be built according to their own needs. Automotive consulting firm IHS predicted that it will produce 217000 electric vehicles around the world on 2014, is expected to account for 0.25% of the world's total output of 87.7 million cars. (information is from the reference room)

动力电池真相 高级电池流言

False or True: Power Battery

文/ 佚名 Text / Die Ming

自从特斯拉被热炒之后，几乎每隔一段时间就会冒出几篇高科技电池电动车的新闻。什么2015年投产的氢燃料电池车，能跑1600公里的铝电池电动车，一次充电跑600公里的液流电池车……

似乎，我们现在用锂电池简直是太蠢了。新的能源革命早就应该到来了，但事实真的像新闻描述的那么美好吗？我们来看看真相。

动力电池的真相

电动车的核心技术是电池、电机、电控，然后就是传统汽车上的底盘技术之类。其中电机技术现在已经比较成熟，电控随着摩尔定律也在不断进步，汽车底盘技术发展了这么多年，更不是瓶颈。

电动车的核心问题就在电池上面。对于电动车来说，理想的电池应该要有以下几个特性：

Since popularity of Tesla, the news about high tech batteries has emerged successively. For example, hydrogen fuel EV, aluminum battery electric vehicle, and fluid battery EV...

It seems, the lithium battery used currently is simply too stupid. The new energy revolution should have arrived, but it really as good as described in news? Let's take a look at the truth.

Truth of power battery

Battery, motor, electric control are the core of the electric vehicle technology, which are followed by the chassis technology in the traditional car and so on. The motor is now more mature technology. The electronic control technology evolves according with Moore's law.

Automobile chassis technology developed over the years is not the bottleneck.

The core of the electric car is on the battery. Batteries for electric vehicles should have the following features:

First, they can have enough energy density. Capacity per unit weight or unit volume is sufficient. As such, the car can run farther away.

Second, They can have enough power density. The power per unit weight or unit volume is sufficient. As such, the car can accelerate



一、有足够能量密度，单位体积、单位重量要有足够的容量，这样才能跑更远的路程。

二、有足够的功率密度，单位体积、单位重量能产生足够大功率，这样车才能加速快，才能爬坡。

三、能量补充速度要快，充电或者换电都要快，要不然就只能限定在城市通勤，白天跑路晚上充电的模式。

四、平均使用成本要便宜，寿命和价格综合起来要有竞争力。

现在已经上市的电动车，主要有两种电池，一种高速电动车的锂离子电池，包括磷酸铁锂、锰酸锂、三元锂电池等等。还有一种是低速电动车的铅酸电池。

按电动车的要求，锂电池功率密度和能量密度都不错，但是充电没法快，价格也高昂。没有补贴支持的话，只能用于特斯拉这种高定位的车型。锂电池是当今电动汽车所采纳的主流电池之一。

铅酸电池功率密度和能量密度都低，充电也慢，但是价格相对便宜，用在短途低速电动车上比较适宜。但是有污染问题，现在中国不鼓励发展。

真正通过了实践检验，现实中可以大规模使用的就这两种。

高级电池的流言

其他流言中很牛的这个电池、那个电池，很遗憾，还没有能够量产上路，有几种有实验性的公交线路在用。流言中高级电池或者根本就不靠谱，或者还在实验室阶段。

一、氢燃料电池

传说中很热的氢燃料电池，我们可以理解成是一种加燃料产生电能，一般不充电的电池。也就是说，氢燃料电池的充电方式其实就是加注氢，和我们传统汽车加油是一样的。

氢燃料电池车的优势是没有污染物排放，氢发电，电机驱动车辆，我们只要把加油站换成加氢站就可以了。

这个过程看上去很简单，但是问题出在氢的制造、运输、储存上。气态氢气需要高压气罐储存，液态氢气需要大量电能维持在很低的温度。使用远比燃油麻烦。

虽然氢气制造并不是很困难，但是把制造好的氢气运输到加氢站，就需要铺设专门的管道。而加氢站给氢燃料电池车加氢，也需要专门的设备。氢有氢脆，对传输、储存的材料要求很高，氢气很容易泄露爆炸燃烧，对设备的安全性要求也很高。

燃油，天然气都有现成的基础设施可以利用，锂电池

fast and climb slopes.

Third, energy supplement should be faster, and so is faster charging or battery changing. Otherwise, the car can only be limited as a urban commuter which runs during the day and is charged at night.

Fourth, the average use cost should be cheap. The life cycle and price should be competitive combinatively.

There are two batteries on sale. The first is the lithium ion battery, including lithium iron phosphate battery, lithium manganese acid battery, ternary lithium battery and so on used in high speed electric cars. The second is the lead-acid battery used in low-speed electric cars.

According to the requirement of the electric car, the lithium-ion batteries are good in power density and energy density. But the charging is not fast, and a price is high. Without subsidies to support, they can only be used for high grade models, for example, Tesla. Lithium battery is one of the mainstream batteries used in the electric car.

Lead-acid battery is low in power density and energy density. Its charging is slow too. The advantages include low prices and fitness in the low-speed EV. On the other hand, there is a problem of pollution, so its development is not encouraged in China.

The above two kinds of batteries are used on a large scale in the reality.

Rumors about the advanced battery

There are some rumors on the battery. Among the so-called advanced batteries, only a few of them are on the pilot use in the public bus lines. In fact, these advanced batteries are simply unavailable or still in the laboratory stage.

1. Hydrogen fuel cells

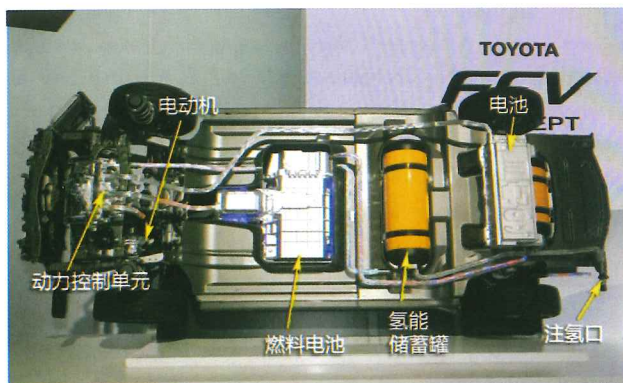
It can be understood to be a battery in which the fuel is used to generate electric energy and does not need any charge. That is to say, the method of the charge in the hydrogen fuel cell is to fill hydrogen, and this is like the method of the traditional fueling.

Hydrogen fuel cell car has the advantages: no pollutants, hydrogen-generated power, and motor used to drive a car. We just replace petrol stations with filling stations.

This process seems very simple, but the problem is on the manufacture, transportation, storage of hydrogen. Gaseous hydrogen requires high pressure tank storage, and liquid hydrogen needs a lot of energy to maintain low temperature.

Although hydrogen production is not very difficult, but it is difficult transported to the filling station, which requires a pavement of pipes. The hydrogen needs to be contained in a special equipment in the filling station. Therefore, hydrogen has strict requirements for the transportation, and storage etc. Hydrogen easily leaks





有现成的电网可以利用。而氢燃料电池车需要从头建立一整套制造、运输、储存的系统，全套的基础设施。这个难度太大。所以，除非有政府不计成本地补贴建设全套基础设施，否则氢燃料电池车就是个花瓶。

二、铝空气电池

铝空气电池虽然是金属电池，其实也应该算作燃料电池。通常铝空气电池也是不充电的，只需要更换铝材料即可。其实铝空气电池的原理类似的助听器里面常见的锌空气电池。

这种金属燃料电池的优点是能量密度比大，缺点是功率密度比低。用在低功率的助听器上没有问题，用在汽车上功率会不太够，往往要配合功率高的锂电池使用。

锌空气电池相比来说比较成熟，已经有量产产品，在汽车上也有试用。

铝空气电池比锌空气电池能量密度更高，有更好的前途，但是因为铝的化学性质问题，难以保证安全稳定，目前连可以量产的成品都没有，实用化为时尚早。

而且，金属燃料电池因为不充电，同样面临着产业链的问

leading to explosion and combustion, so the requirements for the safety of the equipment are also high.

Fuel oil, natural gas has a ready-made infrastructure in use. For lithium batteries, there is a ready-made grid. For hydrogen fuel cell cars, there are needs from the beginning to establish a set of systems used in manufacture, transportation, and storage; a full set of infrastructure. The difficulty is too big. So, unless there is a government subsidy at no cost to build a full range of infrastructure, or hydrogen fuel cell car is a moon in water.

2. Aluminum air battery

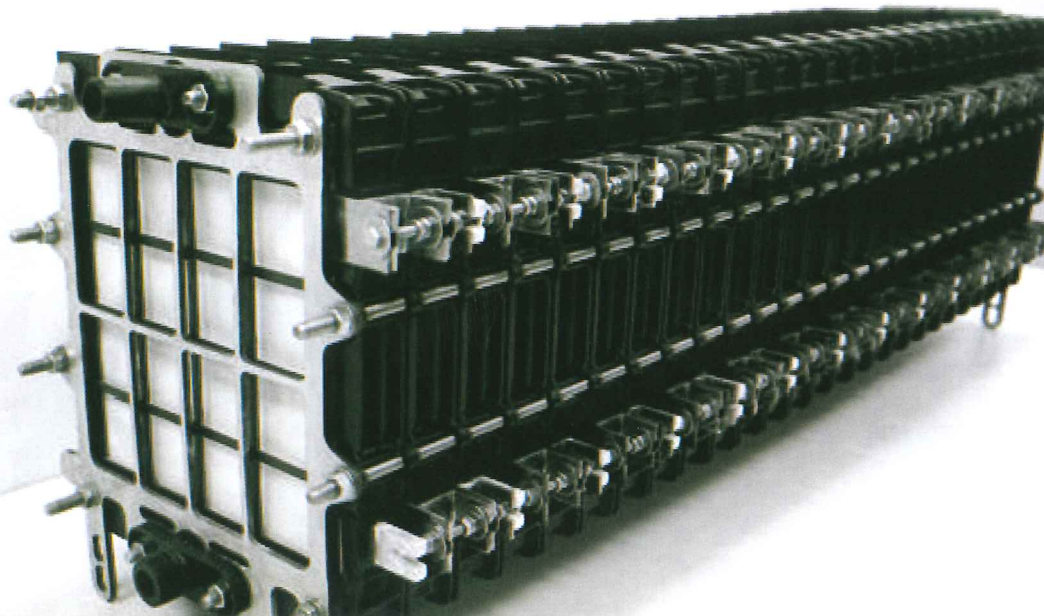
Aluminum air battery is of metal, actually should also be classified as the fuel cell. Aluminum air battery is not usually charged, but what you just need is to replace the aluminum material. Actually the principle of aluminum air battery is similar to the common zinc air battery used in hearing aids.

The metal fuel cell has a advantage of high energy density and a disadvantage of low power density. With no problem when used in low-power hearing aids, it is not enough in power when in cars. Thus, it should be used with the lithium battery which having a high power. Zinc air battery is more mature. For it, there is mass production. It has a pilot use in a car.

Aluminum air battery is higher than zinc air battery in energy density, and has a better future. But, because of the chemical properties of aluminum, it is difficult to guarantee the safe and stable requirements. Now, it is not yet subject to a mass production. Thus, it has a long way to be practically used.

Because of no need of charging, metal fuel cell faces the problem of the industrial chain. Both in zinc air battery and aluminum air battery, the following cycle is used.

1. Metal manufacturing factory to electrolyze the metal oxide so as to get metal;
2. The metal transported to battery change plant;
3. The battery change station to change the metal oxide in the car (a discharge in metal leading to the formation of metal oxide);
4. The metal manufacturing factor to recycle metal oxide so as to produce metal.



题。无论是锌空气电池还是铝空气电池，都是下面这种循环。

- 1、金属制造厂电解金属氧化物制造金属；
- 2、金属运输到换电站；
- 3、换电站用金属更换掉用户电动车内的金属氧化物（金属电池放电完毕生成氧化物）；
- 4、厂方回收氧化物重新电解成金属。

在这个流程中，需要建立一条从制造到运输，到更换，到回收的产业链，同样涉及到基础设施建设。建立遍布全国的换电站几乎是不可能完成的任务。

所以，即使铝空气电池成功，也只能用于城市公交、出租一类可以固定位置换电——出租车在出租公司、公交车在公交公司的场所。全面普及和氢燃料电池同样困难。

三、液流电池

液流电池是普通的化学电池，它的特点是把正极和负极电解液单独存放，解决了普通化学电池活性物质利用率的问题。理论上可以有更高的能量密度，而且充放电次数也更多，有非常理想的性能。

但是液流电池受制于材料和电解液的浓度，发展了多年能量密度依然很低，储能电站可以使用，但不能用于电动汽车。

最近，麻省理工的科学家蒋业明博士发明了半固态锂液流电池，在材料上做了革新，让电解液浓度大幅度提升，这就让能量密度和功率密度达到了实用化的水平。不过，蒋博士的这个电池还在实验室阶段，到成熟的成品尚有时日，更不用说量产了。

但是，液流电池是最近我们看到种种高级电池中最靠谱的一个，只要把实验室技术转化成量产产品，就可以真正改变电动车行业。让电动车跑的更远，价格更便宜，充电更快。液流电池的原理决定它所使用的昂贵材料更少，可以通过电网充电，也可以直接更换电解液完成快速充电，不过更换电解液同样需要产业链配套。

无论是氢燃料电池、金属燃料电池还是液流电池，都不是新生事物，而是发展了几十年的东西。

我们目前上市的电动车使用铅酸电池，锂电池，不是电动车企业蠢，不知道采用新技术，而是在目前能量产能供货的电池中，只有这两种可用是靠谱的，其他或者是技术不成熟、或者是产业链无法配套、或者是成本太高无法商用。

此外，还有飞轮电池、核电池、超级电容等等，存在即合理，一笑了之，不必认真。关于电动车电池的流言可以终结了。

In this process, it is necessary to establish a chain from manufacturing to transportation, change, and recycling, which is also involves the construction of infrastructure and battery change stations nationwide. It is an almost impossible task.

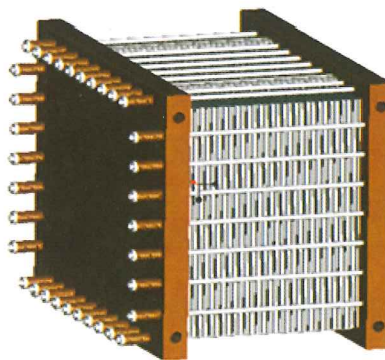
So, even if aluminum air battery is successful, it can only be used for city buses or taxi cars which may require a fixed battery change station. It is difficult for popularization.

3. Flow battery

Flow cell is a kind of ordinary chemical battery. Its characteristic is to store the positive and negative electrolytes separately. This can solve the problem of the active material utilization being low. In theory, it has a higher energy density and a high number of charges and discharges; there is a very ideal performance.

But flow battery has a problem in the material and electrolyte concentration. After many years of development, it still has very low energy density. It can be used in energy storage power stations but not in electric vehicles.

Recently, scientists at the Massachusetts institute of technology Dr



Yet-ming Chiang lithium invented the semi-solid flow battery, made innovation on material, make the electrolyte concentration significantly increase, which makes the energy density and power density is achieved the level of practical application. However, Dr Chiang, this battery is still in the laboratory stage, to the mature product long, let alone a mass production.

On the other hand, the flow cell, as recently we have seen, has high reliability. It has stayed in the laboratory stage, so it is easily subject to the mass production. It may change the EV industry, for it can let EV run farther with lower prices and rapid charge time. The principle of the flow cell determines that it has less expensive materials. It can be charged via the grid and also rapidly charged by direct replacement of the electrolyte. However, such replacement needs the support from the industrial chain.

hydrogen fuel cells, metal or flow batteries are not new. They have decades of years in development.

We currently have seen lead-acid batteries and lithium batteries on sale which are used in EV. The reason is that only these two batteries are mature in technology. The other batteries are not yet mature or supportive from the industrial chain or too expensive.

In addition, there are the flywheel battery, nuclear battery, super capacitor, etc. Existence is reasonable. Laugh it off. Don't have to be serious. Rumors of the electric car battery can be ended.