氨将助力风光等可再生能源实现可持续发展

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**摘要：**

能源与环境问题是当今人类面临的两大挑战，化石能源的使用使得温室气体排放量居高不下而导致全球变暖，因此，世界各国开始大力发展可再生能源。中国的光伏、风电等新能源发展速度居世界首位，但由于地域的限制，同时造成了弃光、弃风等问题。可再生能源制氢为解决这一难题提供了思路。然而，氢的储、运、配等基础设施还远不成熟。氨是一种潜在的理想氢载体。液氨（NH3）在同一体积内实际上比液氢（H2）含有更多的氢，氨几乎可以用于所有类型的内燃机，而且目前工业中的氨基础设施相当成熟。从西北地区太阳能发电的成本来看，其利润和商机已经显现，为此我们开发了风-光-储互补间歇式合成氨微网系统。我们认为（1）风/光的安装量将进一步扩大，必然提高对储能和微网的要求，因此必然带来对大容量、低着火、低污染（无机化）电池的需求，即使用氢氨储能，也必须利用电池解决间歇化与连续化的矛盾；（2）大容量储能电池的开发可以配合局部高压电网的建设，使制氢氨基地可以远离风/光场站。为此，我们利用光伏切割硅废料为原料，开发了低成本高性能的锂电池硅碳负极材料。

关键词：可再生能源、储能、氨、锂电池

Ammonia will help renewable energy including wind and solar energy to realize sustainable development

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**Abstract:**

Energy and environmental issues are nowadays two major challenges. The use of fossil energy continuously creates high greenhouse gas emissions, leading to global warming. Therefore, countries around the world have begun to vigorously develop renewable energy. China's renewable energy development rate ranks first in the world, such as photovoltaic and wind power. However, due to geographical constraints, the problem of power abandonment is becoming increasingly prominent. Producing hydrogen provides a way to solve this problem. However, the infrastructure of hydrogen storage, transportation and distribution is far from mature. Ammonia is a potential ideal hydrogen carrier. Liquid ammonia (NH3) actually contains more hydrogen than liquid hydrogen (H2) in the same volume. Ammonia can be used in almost all types of internal combustion engines, and the ammonia infrastructure in industry is quite mature. In view of the cost of solar power generation in Northwest China, the profit and business opportunities have emerged. Therefore, we have developed a wind-solar-storage complementary microgrid system for intermittent ammonia synthesis. We believe that (1) the installation of wind / light will be further expanded, which will inevitably raise the requirements for energy storage and Microgrid, so even hydrogen and ammonia are applied as energy storage, a battery storage system with large capacity, low ignition, low pollution is also necessary to solve the contradiction between intermittent and continuous of energy; (2) the development of large capacity energy storage batteries can cooperate with the construction of local high-voltage power grid, so that the hydrogen production site can be far away from the wind/solar power station. Therefore, we have developed low-cost and high-performance silicon-carbon anode materials for lithium-ion batteries using photovoltaic cutting silicon waste as raw materials.

**Keywords**: Renewable energy, Energy storage, Ammonia, Lithium battery