KGGU HONG KONG BATTERIES MANUFACTORY LIMITED 香港電池工業有限公司 7 Flat, 10F, Kam Hon Industrial Bldg, 8 Wang Kwung Road, KowloonBay, Kowloon, Hong Kong, China Tel: (852) 27988548-10 lines Fax: (852) 27980321 Email: <u>sales@hk-batteries.com</u> Web site: www.hk-batteries.com



RE: Future Battery:

How much has the battery improved during the last 150 years? Compared to other advancements, the progress has only been moderate. A battery holds relatively little power, is bulky, heavy, and has a short life span. Battery power is also very expensive. The smaller the battery, the higher the cost-per-watt becomes. Yet humanity depends on the battery as an important portable power source.

The speed at which portability and mobility is advancing hinges much on the battery. So important is this energy source that engineers design handheld devices around the battery, rather than the other way around. With each incremental improvement of the battery, the doors swing open for new products and enhanced applications. It is the virtue of the battery that provides us with the freedom of being disconnected from home and office. The better the battery gets, the greater our mobility and freedom will become.



The improved runtime of new portable devices is not credited to higher energy-dense batteries alone. Much improvement has been made in reducing the power consumption of portable devices. Some of these advancements are, however, counteracted with the demand for faster processing time of laptop computers and quicker data transmission of cellular phones.

KGGT HONG KONG BATTERIES MANUFACTORY LIMITED 香港電池工業有限公司 7 Flat, 10F, Kam Hon Industrial Bldg, 8 Wang Kwung Road, KowloonBay, Kowloon, Hong Kong, China Tel: (852) 27988548-10 lines Fax: (852) 27980321 Email: <u>sales@hk-batteries.com</u> Web site: www.hk-batteries.com



The electric vehicle has failed to become the accepted mode of transportation because of the battery. Short distances between recharging and a limited service life of the battery are to blame. Consumers demand a battery that will last for the life of the vehicle but battery manufactures are hesitant to provide the mandatory 8 to 10-year warranty.

Battery research is proceeding at a steady pace. The average annual gain in capacity is typically 6%. In comparison, microelectronics has done much better

Gordon Moore made his famous observation in 1965 when he predicted that the growth in the number of transistors per integrated circuit would double every two years. Through Intel's relentless technological advances, It has been maintained and is being carried into the 21st century. Such advances would shrink a heavy-duty car battery to size of a coin, had this been possible for batteries.

Will the fuel cell replace the battery?

More than 2,000 organizations throughout the world are actively involved in fuel cell development. There is a good reason for this - it's a great concept. And yet, since its invention in 1839 by Sir William Grove, the fuel cell has made little impact in our daily lives so far. In comparison, the internal combustion engine, a development that began at about the same time as the fuel cell, has far broader use.

The fuel cell was used in the Gemini space program in the 1960s, followed by trial runs in buses and cars during the 1990s. One of the main obstacles is high energy cost. The cost-per-watt. must be reduced by a factor of ten to become competitive with other sources, such as the internal combustion engine.

KGG HONG KONG BATTERIES MANUFACTORY LIMITED 香港電池工業有限公司 7 Flat, 10F, Kam Hon Industrial Bldg, 8 Wang Kwung Road, KowloonBay, Kowloon, Hong Kong, China Tel: (852) 27988548-10 lines Fax: (852) 27980321 Email: <u>sales@hk-batteries.com</u> Web site: www.hk-batteries.com



The improvements of the fuel cell during the last 10 years have been moderate. Attempts to mass-produce have failed, even though four public fuel cell companies in North America have raised over a billion dollars in public stock offerings from 1999 through 2001. Unlike other investments that paid early dividends from product sale, returns on fuel cell lies years ahead. Today, 45% of the money raised by the four fuel cell companies is lost.

Fuel cell advocates are promoting a technology that is intended to replace the battery but the opposite is occurring in mobile and portable applications. The fuel cell has a defined power band in which it operates efficiently. Outside this band, the fuel cell loses effectiveness. Sluggish start-up when cold and limited loading are other limitations. Until resolved, the fuel cell will serve as the generator to charge the batteries that do the driving.

There are also problems with the longevity of the stack. The membranes, the core of the engine, degenerate too quickly. The replacement of the stack is a major expense. Until these problems can be resolved, the fuel cell will be reserved for specialty applications, such as providing power (and water) for space vehicles and submarines. Here, no combustion is possible and toxic exhausts cannot be tolerated.

Experts believe that the fuel cell, as we know it today, would only be implemented in vehicles if the supply of fossil fuel is exhausted or if mandated by law due to environmental concerns. Comments have been made that the fuel cell may never become the engine of choice for mass-produced cars. This is in line with the notion that the steam engine of the 1800s was never intended to propel airplanes.

Continuous improvements in the fuel cell are being made but the results are slower than with other technologies. Eventually, the fuel cell will find important niche markets that dwell outside the domain of the polluting internal combustion engine. Should a major break-through occur and the fuel cell does become an alternative power source, the world would become a cleaner place and humanity would be thankful for it.

HONG KONG BATTERIES MANUFACTORY LIMITED 香港電池工業有限公司 7 Flat, 10F, Kam Hon Industrial Bldg, 8 Wang Kwung Road, KowloonBay, Kowloon, Hong Kong, China Tel: (852) 27988548-10 lines Fax: (852) 27980321 Email: <u>sales@hk-batteries.com</u> Web site: www.hk-batteries.com

What is the ultimate miracle battery?

The ultimate miracle battery is nowhere in sight and the battery remains the 'weak link' for the foreseeable future. As long as the battery is based on an electro-chemical process, limitations of power density and short life expectancy must be taken into account. We must adapt to this constraint and design the equipment around it.

People want an inexhaustible pool of energy in a small package that is cheap, safe and clean. A radical turn will be needed to satisfy the unquenchable thirst for portable and mobile power. It is anyone's guess whether a superior electro-chemical battery, an improved fuel cell, a futuristic atomic fusion battery or some other groundbreaking energy storage device will fulfill this dream. For many, this break will not come in ones lifetime.

To contact our professional Team: <u>hkbatt@hk-batteries.com</u> (Mr. Thomas To) for the detail.





