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Director Dr. Masahiko Oshitani Awarded the Spring 2007 Purple Ribbon Medal of Japan!

Dr. Masahiko Oshitani, director of the Research and Development Center in GS Yuasa Corporation received the 2007 Purple Ribbon Medal* of Japan in recognition of both the prominent scientific achievement of his lifework, the development of high-performance nickel hydroxide positive electrode for Ni/MH battery and the great contribution to secondary battery industry, especially Ni/MH battery field in which Japan leads the world. This is something that we, battery engineers, can be proud of and which serves as an encouragement for the future research. Our sincere congratulations go to Dr. Oshitani.

In 1973, Dr. Oshitani joined Yuasa Battery Co., Ltd., one of the predecessors of current GS Yuasa Corporation, and has then constantly engaged in the research and development, and commercialization of alkaline batteries. In particular, he was the pioneer in the world to develop the original technology for high-performance paste type nickel hydroxide positive electrode in Japan leading to create cadmium-free and environmentally friendly, high-energy-density Ni/MH battery which makes him a world authority on this filed. The methods and foresight in the material development of his R & D activity will provide us much to learn from and further might be a way model for us to follow as loadstar. For these reasons we will introduce the overview of his scientific achievements below.

In the background of the great interest shown to Ni/MH battery in the early 1990s, there were great efforts to make portable electronic devices smaller, lighter, and cordless owing to attention focused on

environmental problems — the desire to develop eco-friendly, high-energy-density battery and bring it into practical use to replace Ni/Cd battery mainly used until then.

However, the main nickel hydroxide positive electrode with cadmium additive, discharge limited electrode in cell, had been sintered type having low capacity theoretically, and so the essential task for Ni/MH battery, of which users strongly demanded higher energy density, was to develop and bring into practical use a new type electrode with both higher capacity and environmentally friendly additive.

To solve this problem, Dr. Oshitani made mainly the following three inventions.

(1) He controlled the pore structure within nickel hydroxide particles to synthesize the material in the nanometer level, thereby reducing pore volume (the voids inside particles) to one-third or lower compared with the existing paticles; he endowed the nickel hydroxide particles themselves with higher capacity; and he succeeded in the development and practical application of close-packing, high-density, spherical nickel hydroxide particles.

(2) He discovered of cobalt additive forming a micrometer-scale conductivity network among nickel hydroxide particles and succeeded in substantially increasing the utilization of pasted nickel electrode to 100% from the low value of 50%. As a mechanism for this effect, he proposed the theory that cobalt oxyhydroxide (CoOOH) conductivity network is formed, and the originality of his theory has been highly rated for its science worldwide. Indicative of this is, for example, two invited lectures from the Electrochemical Society (ECS) in U.S.A.

(3) He discovered a technology to prevent swelling phenomenon involved in nickel hydroxide electrode resulting in one failure of alkaline battery. This is a method of adding zinc instead of the formerly used hazardous metal of cadmium. With this method Dr. Oshitani successfully led the world in achieving a longer-life and environmentally friendly Ni/MH battery that is completely free of cadmium.

These three achievements realized the technology for eco-friendly past type nickel hydroxide electrode with higher capacity to replace conventional sintered type one. This technology now finds broad worldwide application as an essential technology for the positive electrodes in various alkaline batteries. Dr. Oshitani's inventions constitute a Japan-born technology which opened the way for the practical application of high-energy-density Ni/MH battery and brought Japan's battery industry into its current preeminent world position.

* Purple Ribbon Medal is awarded from Japanese government to individuals who have greatly contributed to developments, improvements, and accomplishments in the field of art and science.

次世代ハイブリッド自動車用の高出力円筒形ニッケル水素電池「プロシウム（PROTHIUM）」™を開発

（株）ジーエス・ユアサ コーポレーションは，優れた出力性能と寿命性能がある次世代ハイブリッド自動車用ニッケル水素電池「プロシウム（PROTHIUM）」™を開発いたしました．今後，「プロシウム」の事業化に向けた取り組みを一層強化してまいります．

ハイブリッド自動車は今後大きく需要が伸びていく成長分野ですが，その最も重要なキーデバイスとして2次電池があります．特に，ニッケル水素電池は，高い安全性と信頼性があるために，ハイブリッド自動車用電池として現在，主流となっていますが，リチウムイオン電池などの検討が進められている中，さらなる「高出力密度化」や「低コスト化」が求められています．

当社は，電池の内部抵抗を従来の50％以下とする新工法の採用により電池構造設計を最適化するとともに，活物質の充電・放電反応時の抵抗を大幅に抑制する独自な電極技術を適用して，従来のニッケル水素電池の性能を大幅に進化させた次世代電池「プロシウム」を開発，第1世代電池（円筒形シンター式）の2倍（当社従来品比），第2世代電池（従来工法採用の円筒形ペースト式）の1.4倍（当社従来品比）という世界最高水準の出力密度1800 W/kg（6100 W/l）を達成し，高温環境下での耐久性が当社従来品比で2倍に向上しました．

本電池は国内外の自動車メーカーに対してすでに試作品を供給しており，次世代ハイブリッド自動車用電池として高い評価を受けております．

また，出力やエネルギー回生性能にもすぐれているため，ハイブリッド自動車用のほかにも，高出力が要求されるエネルギー回収用電池としても最適です．

＜特長＞

1. 高出力

　円筒形ニッケル水素電池では世界最高水準の出力密度1800 W/kg（セル基準）を実現し，車輌の燃費と加速などの車の運動性能向上に大きく貢献する．

2. 長寿命

　45 ℃を超える高温環境下で，当社従来品比で2倍の寿命性能があり，従来よりも過酷な環境下での使用を実現する．

3. 安全性と信頼性

　従来の当社ニッケル水素電池と同様，高い安全性と信頼性がある．

4. コスト

　出力当たりの単価で比較すると，当社従来品比で20％のコストダウンを実現できる．

＜問い合わせ先＞

（株）ジーエス・ユアサ コーポレーション　広報室