Battery Based Energy Professional,

Tium Research Co., Ltd.

Business Overview

March, 2015

Tium research

Blooming the Energy in your Device

1. Introduction

Tium research

Blooming the Energy in your Device

- CEO : **Sungchul KIM**
- Established : July, 2008
- Address : #303 TSSC, 23-14 Jang-dong, Yuseong-gu, Daejeon, Korea
- Homepage : **www.ti-um.kr**
- TEL : +82-42-863-7100

Business Domain

- Customized Battery Supply
- Special Battery R&D
- Battery Consulting

Patent : 5 listed Patents
(Heat Resistance Separator, etc.)

R&D Program : 4 Government Projects
(Tech-Innovation Project by SMBA, etc.)

Has Core Technology for battery business!

- **Technical competitiveness of core factors :** i.e. cathode, anode, electrolyte.
- **Packaging skills :** i.e. BMS, Design, SW
- **Expanded industry knowhow :** i.e. charge/discharge, protect circuit etc.
- **Evaluation & quality management ability**

Has Variety Experience in battery industry !!

- **Variety of size & type :** from subminiature cells to huge pack batteries
- **Variety of device :** hearing-aid, cellular-phone, MP3, EV, e-Bike, cart
- **Variety of client :** from global companies (i.e. Samsung, SONY, Toshiba, LG, Siemens) to startups.

Has Alliance & Network beyond battery!!!

- **Alliances** with various companies such as motor, inverter, charger manufacturers.
- **Networks** for R&D, manufacturing, equipment and trade.
- **Open partnership** for battery business.

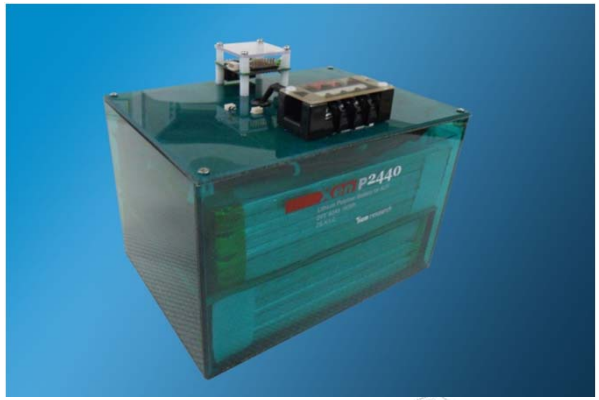
2. Customized Battery Pack

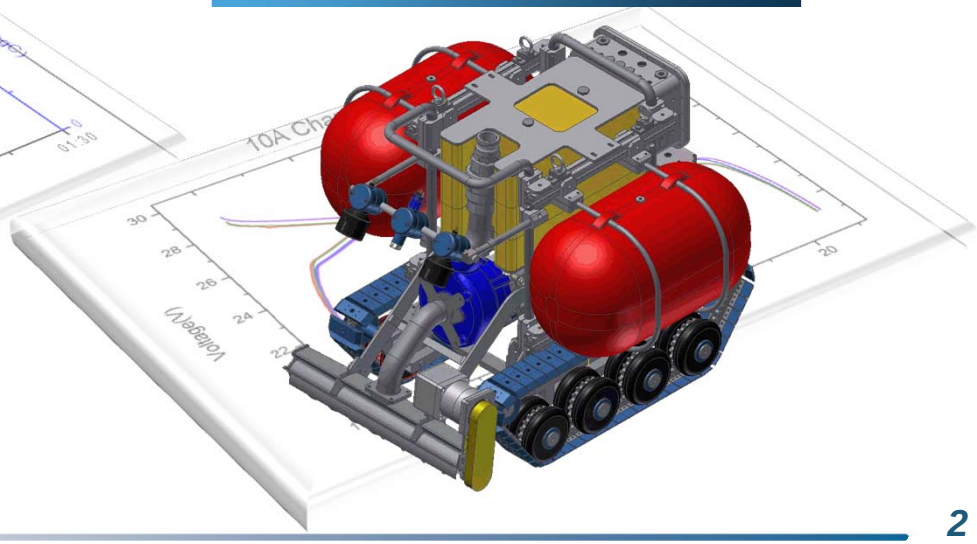
Develop & Supply of Battery Packs for Optimized

☞ Consider temperature, discharge characteristics, size, weight, duration, efficiency, etc.

Xen P6020 (6040)

Xen P2440 (2480)





3. Smart BMS

Design & Test of Special Functional BMS

☞ Develop the smart functional BMS which has battery protection, cell-to-system monitoring, temperature-control, multi-protocol communication, motor information, etc.

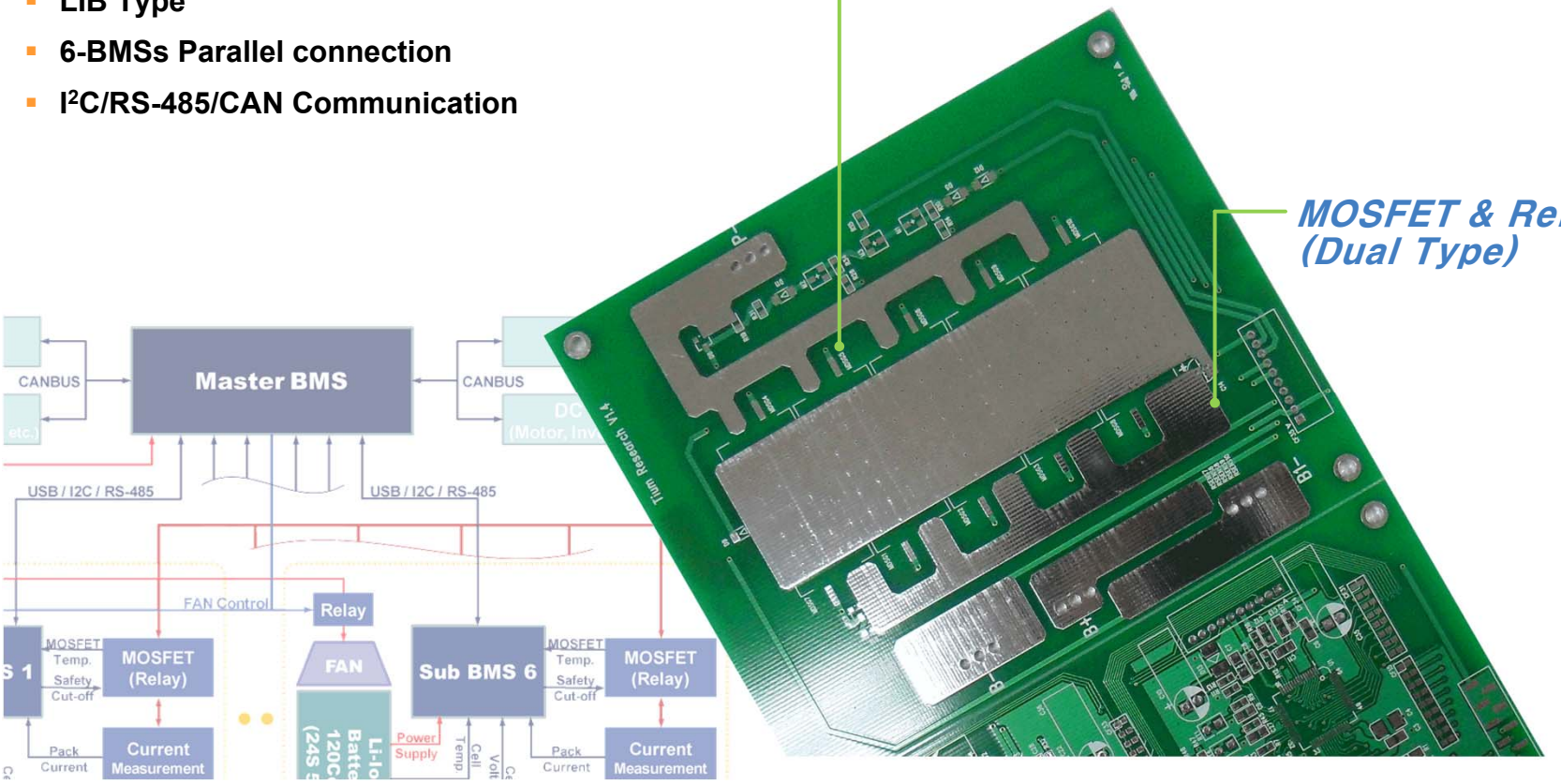
24 S

for **Fuel-cell EV**

- **LIB Type**
- **6-BMSs Parallel connection**
- **I²C/RS-485/CAN Communication**

High Power : 89V 60Ah

MOSFET & Relay (Dual Type)



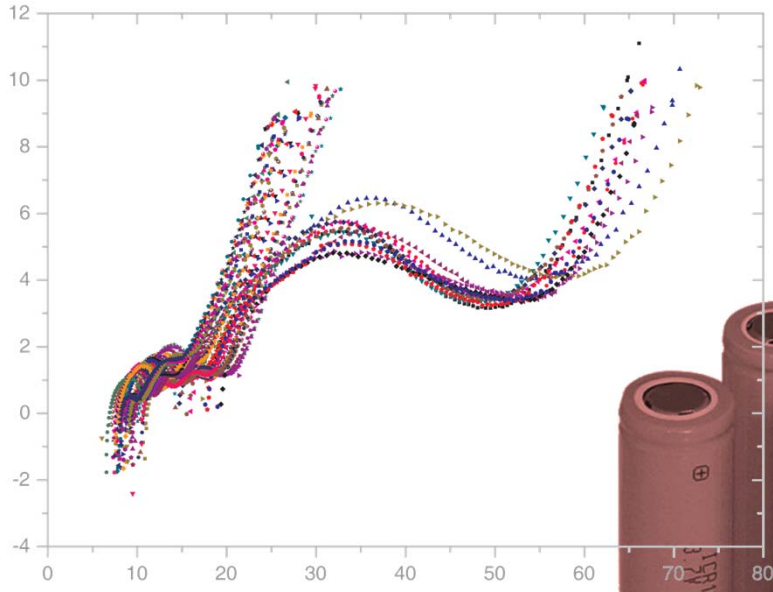
4. Consulting Service

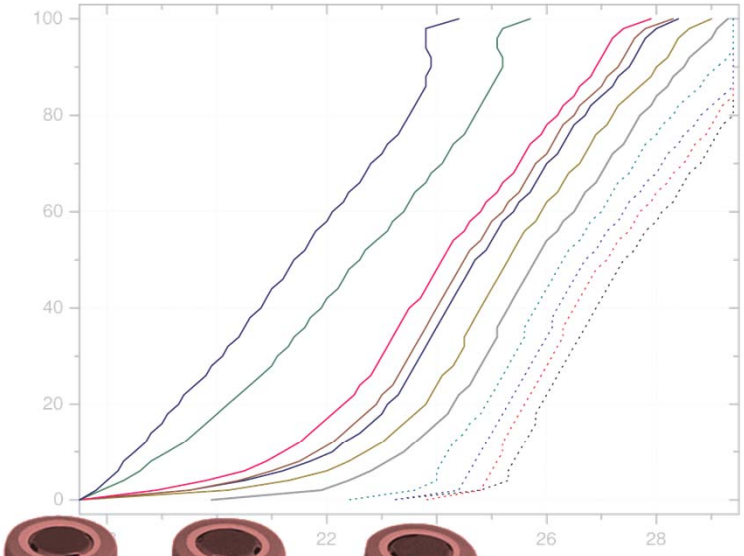
Evaluation the Battery of Performance, Safety, Longevity, etc.

☞ Consult about battery like as performance evaluation, safety test, reliability test, capacity test, cell recommendation, quality test, certification, etc.

Capa Prediction

- **Impedance Analysis**
- **Capacity Prediction**
- **SOC / SOH**





5. Special Cell Design

Develop the special Battery of fit for order.

☞ Develop the special battery like as subminiature cell, material change, capacity upgrade, etc.

MCR 960

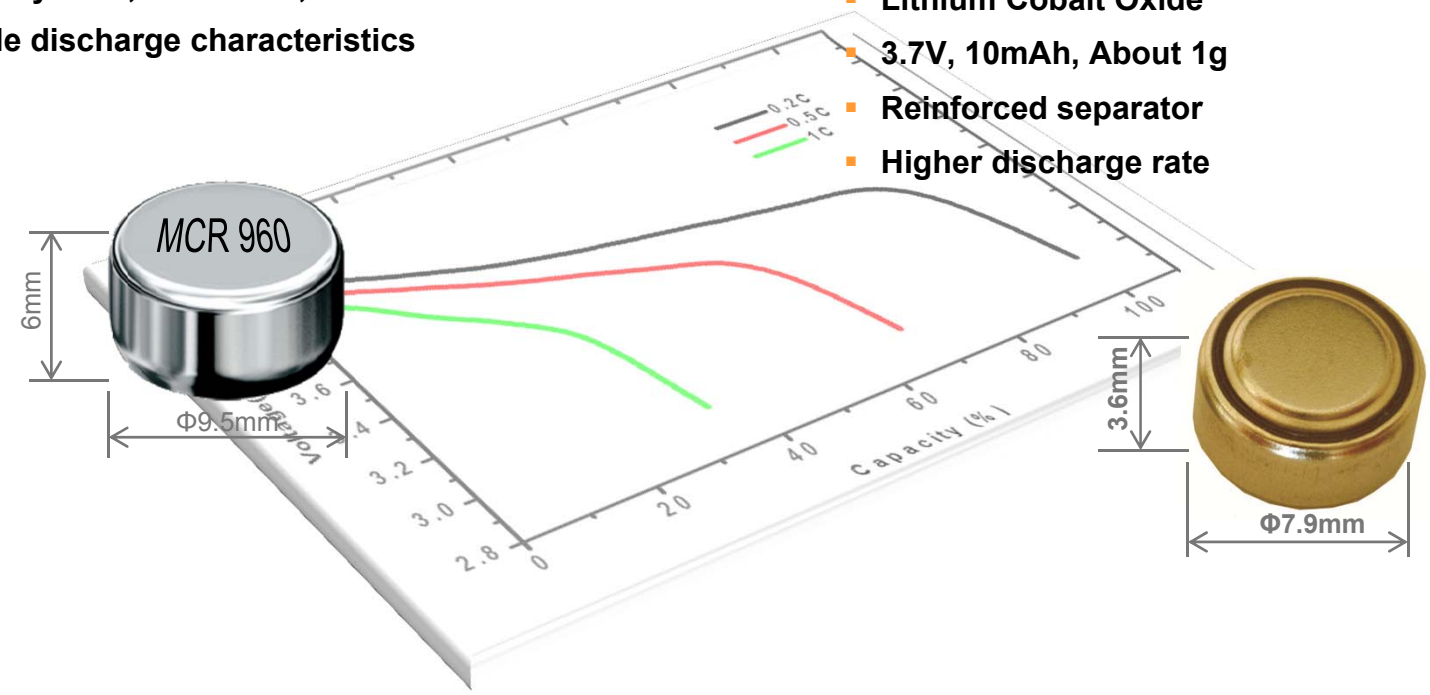
for **Capsule endoscope(Primary battery)**

- **Lithium Manganese Dioxide**
- **3V, 60mAh, About 2g**
- **Mercury-Free, Lead-Free, Cadmium-Free**
- **Stable discharge characteristics**

MHA 730

for **hearing-aid(Secondary battery)**

- **Lithium Cobalt Oxide**
- **3.7V, 10mAh, About 1g**
- **Reinforced separator**
- **Higher discharge rate**

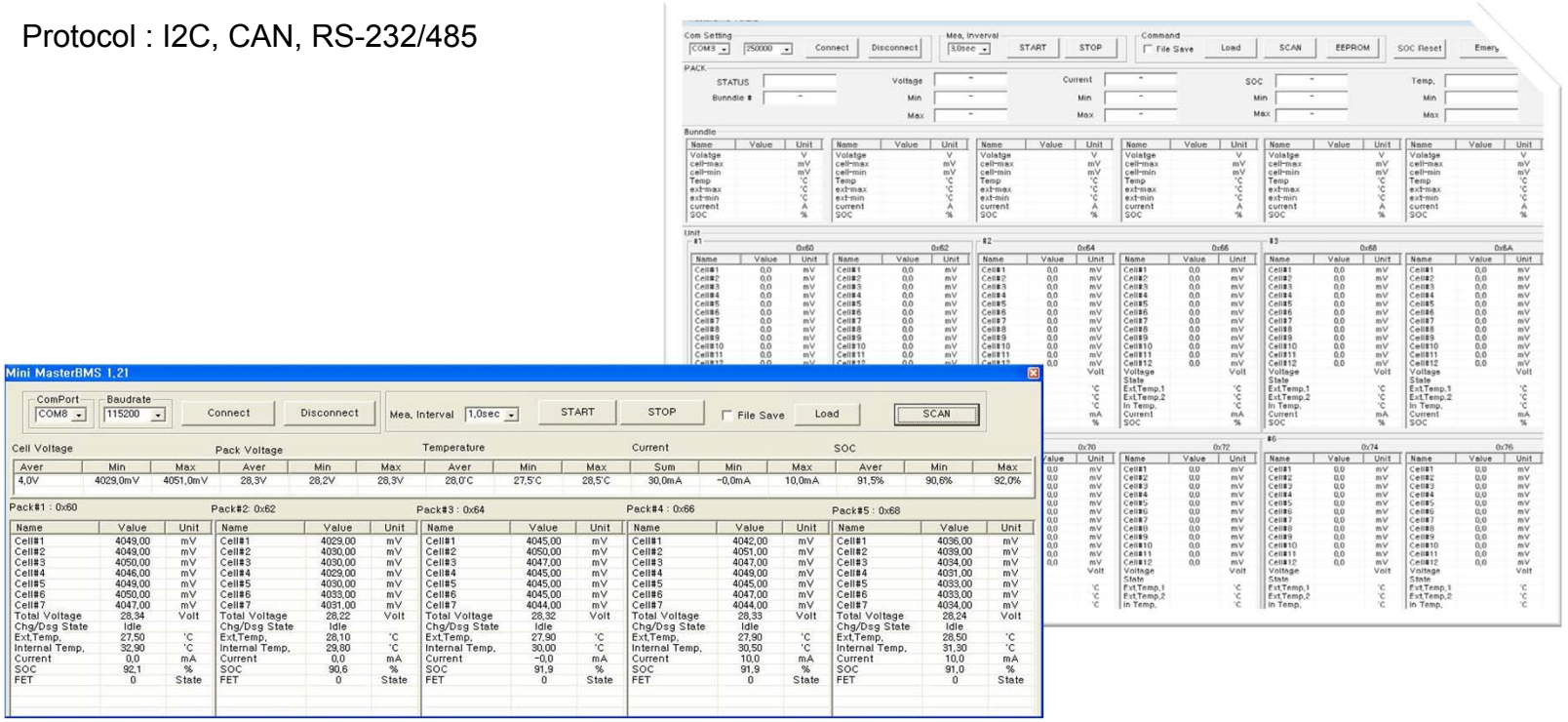


6. Support Program

Develop the Program & Support Protocol for Real-time Battery Status & Data

Mini 1.2 & Master 2.1

- 5-BMSs / 24-BMSs Connectable
- SOC Calculating
- Statistics Briefing
- Protocol : I2C, CAN, RS-232/485

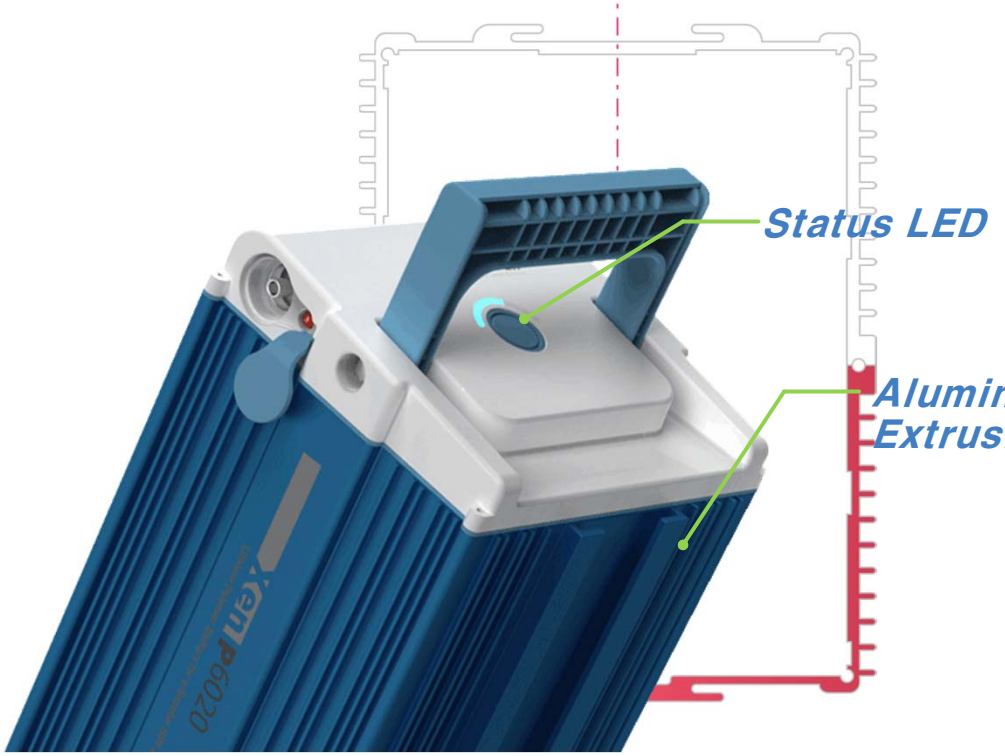


7. Battery Case Design

Design the Case which is fit for Device Structure

Xen P6020

- **Structure Design**
- **Material Research**
- **Waterproof & Heat dissipation**



Xen F12120

- **High-power & High-energy**
- **Pack information Display**
- **Accurate SOC**