INTRODUCTION

AGRICULTURAL WASTE
- 1.2 million ton/year
- Eg: Animal manure & crop stalks

CHEMICAL BATTERY
- Poor power density
- Low storage capability
- Environmental pollution

BIOMASS BATTERY
- Low cost, Eco-Friendly, Renewable energy. Non-toxic
- Eg: Banana peel, Coconut husk, Sugarcane bagasse

OBJECTIVES
- To prepare three type of biomass activated carbon (BAC) from three different waste namely; sugarcane bagasse, coconut husk and banana peel
- To investigate the potential of newly developed BAC in production of electrical energy in lithium ion battery

MATERIALS & APPARATUS
- BANANA PEEL
- SUGARCANE BAGASSE
- COCONUT HUSK
- SODIUM HYDROXIDE
- MANGANESE(IV) OXIDE
- DISTILLED WATER
- GLASS ROD
- BEAKER
- MULTIMETER

METHODOLOGY
- SB, CH and BP
  - Clean With water
- Dried in oven + crushed
- Furnace(450°C, 2h)
- BAC mixed with NaOH and MTO

Why did we choose this three biomass?
The major agricultural crops grown in Malaysia are rubber (39.67%), oil palm (34.56%), sugarcane (6.75%), banana (12.68%) and coconut (6.34%). In Malaysia, 1.2 million tonnes of agricultural waste is disposed into landfills annually (Jain et al. 2013).
- Contain Cellulose
- No harmful waste
- Abundantly available (1.2 million ton/year)

RESULT & DISCUSSION

a) CHARACTERIZATION STUDY
i) SEM-EDX
ii) FTIR Analysis

b) ELECTRICAL CONDUCTIVITY STUDY
i) Voltage
ii) Current

Figure 1: Voltage produced against 3 type of BAC at different mass

Figure 2: Current produced against 3 type of BAC at different mass

Figure 3: Current density against Lifetime

Figure 4: Current density and Power density of BAC-biomass battery

Figure 5: pH against Lifetime

FINAL PRODUCT

CONCLUSION
1. Biomass activated carbon bio-battery are successfully developed using agricultural wastes.
2. All three BAC bio-batteries are synthesized without any chemical modification.
3. The most efficient bio-battery: Banana peel derived bio-battery

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REFERENCES
Jain, A. et al. Activated carbons derived from coconut shells as high energy density cathode material for Li-ion capacitors. Scientific Reports. 3, 3002 (2013)