CP 1

CONCEPT PAPER

for KIER International Cooperation project

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Title	Core–technology Development of Si-imbedded Expended MCMB(Micro Carbon Micro Bead)from Coal-tar and low Rank Coal for High Density Energy Storage System			

Description

- Objectives
  - To develop a high-value carbon materials for environment energy from coal tar and low rank coal
  - To develop high-density MCMB by manufacturing and mixing pitch from low rank coal
  - To develop a high-capacity secondary battery (Li-ion battery) anode material modified by Si/E-MCMB(Si-imbedded Expanded Micro Carbon Micro Bead)
- Barrier(s) to tackle
  - Mesophase small size control technology development
  - Research on mechanism of mesophase microsphere generation.
  - Development of high yield process through MCMB extraction and modification.
  - Identification of sintering process of MCMB according to graphitization process conditions.
  - Study on characteristics of secondary battery anode materials according to Si content imbedded in E-MCMB.
- Strategy to solve
  - China's experience in large-scale pitch polymerization will help build a mass production facility for basic carbon materials.
  - The MCMB material market is more than 50% in China, so it is essential for cooperation of China in terms of strategic business.
  - This research can advance the global market by securing advanced technology. Especially, KIER's Si/E-MCMB technology is very promising as a future strategy technology.

Outcomes*

- Improving the manufacturing process of MCMB and Si/E-MCMB:
  MCMB Yield over 60 %, Fixed carbon over 90 %, Mean diameter 13um,
  d-spacing(d002) under 3.362 Å
- High-density MCMB in Li-ion energy storage:
  C-rate(2.0, MCMB) over 95%, Discharge capacity(MCMB) over 360 mAh/g
- Si/E-MCMB in Li-ion energy storage:
  C-rate(2.0, Si/E-MCMB) over 85 %, Discharge capacity(Si/E-MCMB) over 700 mAh/
- Quantitative outcomes

	Patents				Publications	
	Domestic		International		SCI(E)	Etc.
Target	2		2		4	1