# An Industrial Production Process for Meso-Carbon Microbeads

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Abstract. An industrial production process for "Meso-carbon microbeads" has been established. This process consists of a heat-treator of coal tar, whose primary QI was removed, and a high temperature centrifuge, which separates "Meso-carbon microbeads" from the pitch matrix efficiently and continuously.

Application of the product to high density isotropic carbon solids was also confirmed.

## Introduction

Carbon materials are used as fundamental source materials for industry, especially for electronics, nuclear energy, space industry and so on. As their importance has increased, high density, high strength and isotropic solid have become quality requirement.

"Meso-carbon microbeads" had been recognized as a promising carbonaceous material which can be molded and calcined without any binders,[1] but no industrial production processes were developed because of the difficulty in separating them efficiently from the pitch matrix.

## Process Flow

Our process flow was shown in Fig.1. Coal tar(1), separated water and light oil in the dehydrating tower, was fed into a high temperature centrifuge(2) in order to separate primary QI at temperature above 100°C; the efficiency of separation of QI was more than 95%.

The QI removed tar was fed into the CHERRY-T reactor(3) by the rate of 0.7ton/hr through a heating furnace and heat-treated under pressure, prompting the cracking and condensation reaction of coal tar. During the reaction, optically anisotropic micro spheres developed and co-

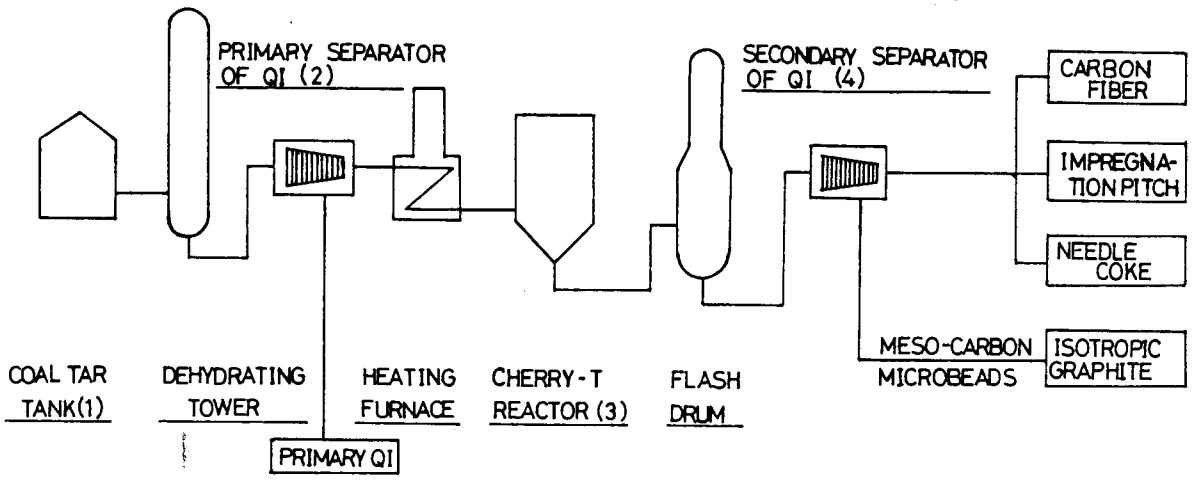


Fig. 1. Process flow

alesced with each other to form larger spheres.

The reacted tar was fed into a high temperature centrifuge(4) before their diameter became larger than desired.

The solid particles were washed by coal tar middle oil and pure organic solvent and then dried.

The quality of the meso-carbon microbeads is determined mainly by their diameter and purity, which can be controlled by the reaction and washing conditions.

QI free reacted tar was comfirmed to be good for carbon fiber, needle coke and so on.

## Properties of Meso-carbon microbeads

### Analytical Data

Various kinds of microbeads can be produced by controlling the reaction and washing conditions.

Table 1. Analytical data of meso-carbon microbeads.

| BI(%) | QI(%) | FC(%) | ASH(%) | VM(%) |
|---|---|---|---|---|
| 90 ~ 99 | 80 ~ 97 | 85 ~ 92 | 0.1 ~ 0.3 | 8 ~ 15 |

### SEM Picture

A SEM picture of a typical sample is shown in Fig. 2. Perfect spheres which have a narrow diameter distribution can be obtained.

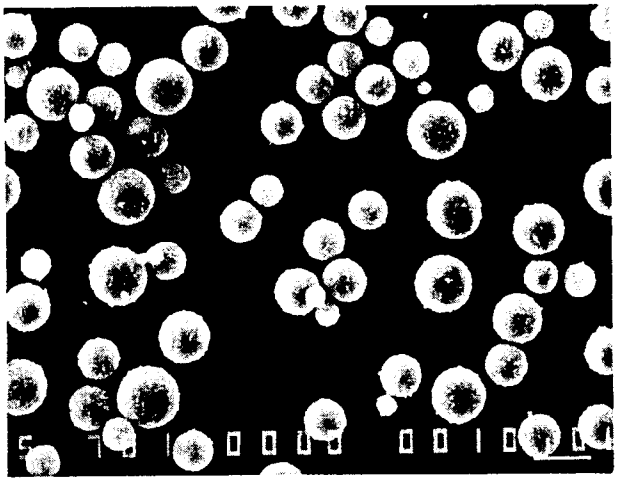

Fig.2. SEM picture of meso-carbon microbeads.

### Diameter Distribution

The diameter distribution of a typical sample was shown in Fig.3. It can be controlled in the range from 2 μm to 80 μm by varying the reacting condition.

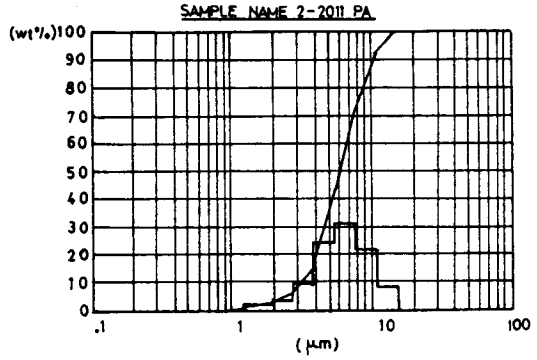


Fig.3. Diameter distribution of a typical sample.

## Applications for high density isotropic carbon solids

Meso-carbon microbeads can be molded by conventional pressing without any binders, yielding a high density and high strength isotropic carbon solid.[2]

Typical properties of green and calcined tablets made of our microbeads were shown in Table 2.

Table 2. Tablet properties

| *Green | **Calcined at 1000°C | | |
|---|---|---|---|
| Density ($g/cm^3$) | Density ($g/cm^3$) | Bending Strength ($kg/cm^2$) | Compressive Strength ($kg/cm^2$) |
| 1.34 | 1.67 | 1400 | 3800 |

* molding pressure: 2000kg/cm$^2$
tablet size: 37.5φ
** calcining condition: 1000°C, 1hr

From our microbeads, it had been confirmed that a commercial sized graphite can be obtained.

## References


1. H. Honda, Y. Yamada et.al.,"Reports of the Government Industrial Research Institute, Kyushu", Mar. 1980.
2. Y. Yamada, K. Shibata, H. Honda et.al., vol. 88, Tanso, pp 2-8, 1977.