

# Characteristics of self-sintering carbon particles for high density isotropic graphite materials

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## **Introduction**

Spherule particles containing suitable binder ingredients are obtained when the spherules are isolated from the pitch matrix by solvent separation using organic solvent. The binder fraction of MCMB (meso-carbon micro beads) can be controlled, depending on the type of solvent and the conditions of separation and extraction. When heat treatment of pitches is continued, the spherules undergo coalescent growth and form coke. The petroleum and coal tar pitch cokes(semi-coke) also used as the principal raw carbon materials of emergence after coking, They usually have a volatile fraction content of approximately ten percent; that is considerable amounts of binder fraction.

High density isotropic graphite material is very efficient material for nuclear graphite. Self-sintering carbon materials are very famous raw material for fabrication of high density isotropic graphite materials by single phase fabrication method. In this study, considerable amount of binder fractions and characteristics of self-sintering carbons were examined.

## **Experimental**

### *Heat treatment*

The some kinds of self sintering carbon powders were prepared used coal tar pitch and FCC-DO are listed in table 1, with some of their characteristics. Coal tar pitch and FCC-DO were heated under flowing nitrogen in a Pyrex kettle to 450°C and further heated under nitrogen bubbling for variable times. The residues were pulverized and the solubility

of the pulverized powders were examined in quinoline(Q) and insoluble fraction was examined with scanning electron microscopy (SEM) after isolation.

Table 1. Characteristics of self sintering carbon powders

Sample name	Yield(wt%)	F.C(wt%)	QI(wt%)
CRT-1	72	93.7	88.9
CRT-2	73	93.4	89.6
CRT-3	70	93.4	89.5
CRT-4	70	94.2	90.0
JOG-1	50	94.7	91.5
JOG-2	50	94.6	91.5
JOG-3	53	94.3	90.0

#### *Forming, carbonizing and graphitizing*

The extracted powder was molding and than carbonizing under inert atmosphere in the box furnace at 1,000°C for 1hr. The carbonized solid was further heat treated to 2,300°C. After carbonizing and graphitizing, solid fracture was examined with optical microscopy (OM) and scanning electron microscopy (SEM).

#### **Results and Discussion**

Figure 1 shows a scanning electron micrographs of self sintering carbon powders derived from coal tar pitch. The powders are shown different morphology of spherical and irregular shape. The particle size distributed from sub-microns to 30 microns. The binder fraction of powders ranged from 8 to 11 percent as shown in table 1.

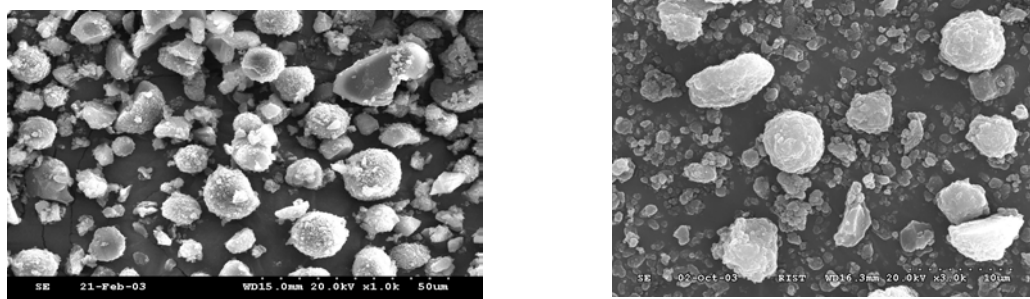


Figure 1. Scanning electron micrographs of self sintering carbon powders