POSTER

A NEW HIGH PROPERTY THERMAL INSULATION FOR HIGH TEMPERATURE

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INTRODUCTION

At present, the thermal insulations used in high temperature conditions, such as the insulations in CVD furnace, graphitizing furnace, in metallurgical fields, are almost carbon — felts, carbon black and coke. As we know, the carbon felts are made from short carbon fiber, and the coke consists of grains of disordered shape. Some shortcomings are brought about by the properties of their own, the carbon black and coke usually make the furnace dirty and difficult to clean, the carbon felt is peeled off easily, and can be compressed, even have no compress strength, the thermal insulation coefficient of it changes with the deformation extent.

The extra —low density carbon —carbon which we have developed gets rid of the defects of traditional insulations. On the other hand, the technological process of this extra —low density carbon—carbon composite is easy to implement and low in cost. The properties can be adjusted freely according to different needs.

EXPERIMENTAL

Raw materials and process:

Short —cut carbon fiber, thermosetting phenolic resin, coke, chemical foamer, surface active agents and water.

After each of these materials having been dispersed in water respectively to be latex by the help of active agents, the following steps are mixing, vacuum filtration, drying, solidification and carbonization, whether it is graphitized or not depends on the use conditions and the needs.

The process schedule is as follow:

each material dispersed in water → mixing → vacuum filtration → drying → solidification → carbonization →(graphitization)

RESULTS & DISCUSSION

Whether the raw materials are well —dispersed is the most important factor of the success of the study. Some SEM photographs of the material are shown in figure 1. From these photos, we can find that each component is well—distributed, evenmore, the width of a bundle of carbon fiber is about 10μm, which is approaching the diameter of carbon fiber, so the fiber can reinforce the material fully.

Table 1 shows the properties of cabon —felts, coke, and several kinds of the extra —low density C—C of our study. Each kind of these extra —low density C—C has a unique prescription, which can be adjusted freely according to different usage.

Compared with carbon —felts and coke, we can see that the extra — low density C — C have much higher compressive strength, and are most difficult to drop off, and comparatively, they have little shortcomings, they are the best ther-

mal insulations in high temperature conditions.

CONCLUSIONS

The extra — low density C — C composite has been achieved by the process of dispersing, mixing, drying, solidification, carbonization and graphitization. At present , the material is the best thermal insulation for high temperature.

REFERENCES

1. A. Kelly, S. T. Mileiko, Fabrication of composites ,Handbook of Composites, Vol. 4, 1983, NEW YORK.

2. Fitzer, E. and Karlische, K. , 13th Biennial Conference on Carbon at Irvine, Extended Abstracts, 1977, p353.

Table 1 Properties of Different Insulations

	Density ($\times 10^3 kg/m^3$)	Thermal—conductivity coefficient (W/K • m)	Compress strength (MPa)
Carbon—felts	0. 1—0. 2	0. 20	About Zero
Coke	0. 4—1. 0	1—40	/
A*	0. 26	0. 24	0. 31
B*	0. 33	0. 23	0. 85
C*	0. 45	0. 26	0. 76
D*	0. 55	0. 37	1. 10

* ;Extra—low density C—C we have developed.

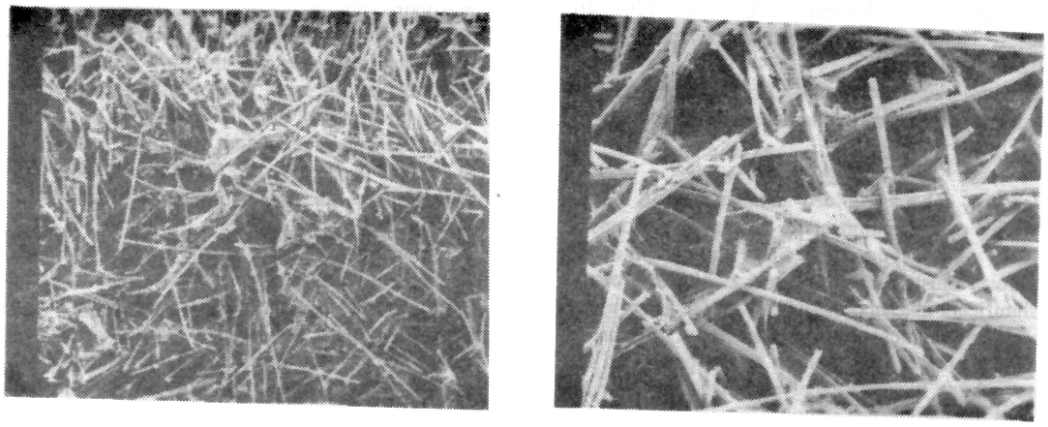

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Fig. 1 Microstructure of Extra—low Density C—C