

Electrical Discharge Sintering and Graphitization  
of Carbon Powders

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Both instantaneous sintering and graphitization by electric spark discharge were examined on amorphous carbon powders such as petroleum coke, thermal black and Akabira coal in order to get a compact graphitized carbon solid in a short time. These carbon powders were charged in a carbon capsule, and electric pulse current was passed through the carbon powders for a time between 60 sec and 300 sec, compressing by the pressure in the range from 175 to 350 Kg/cm<sup>2</sup>. A compact plate-like solid of sintered and graphitized carbon was obtained in this way. The degree of sintering and graphitization of the compact specimen was examined by microscope and X-ray analysis. The more compactly sintered carbon solid for petroleum coke and thermal black was obtained by putting the longer discharging time in it. Some of the sintered thermal black specimens were gradually decomposed to fine powders within a month or so. X-ray data show that the remarkable graphitization occurred in every specimen and its degree was more conspicuous in the specimen which was supplied higher discharging energy. The sintered thermal black and Akabira coal show composite (002) profiles with d spacing of 3.44 - 3.42 Å (broad component) and 3.36 Å (narrow component), and the latter peak of 3.36 Å becomes sharper and stronger with increase of the discharging energy, while the sintered petroleum coke shows single (002) profile. Fig. shows the change of d(002) spacing of the sintered and graphitized carbons as a function of discharging time.

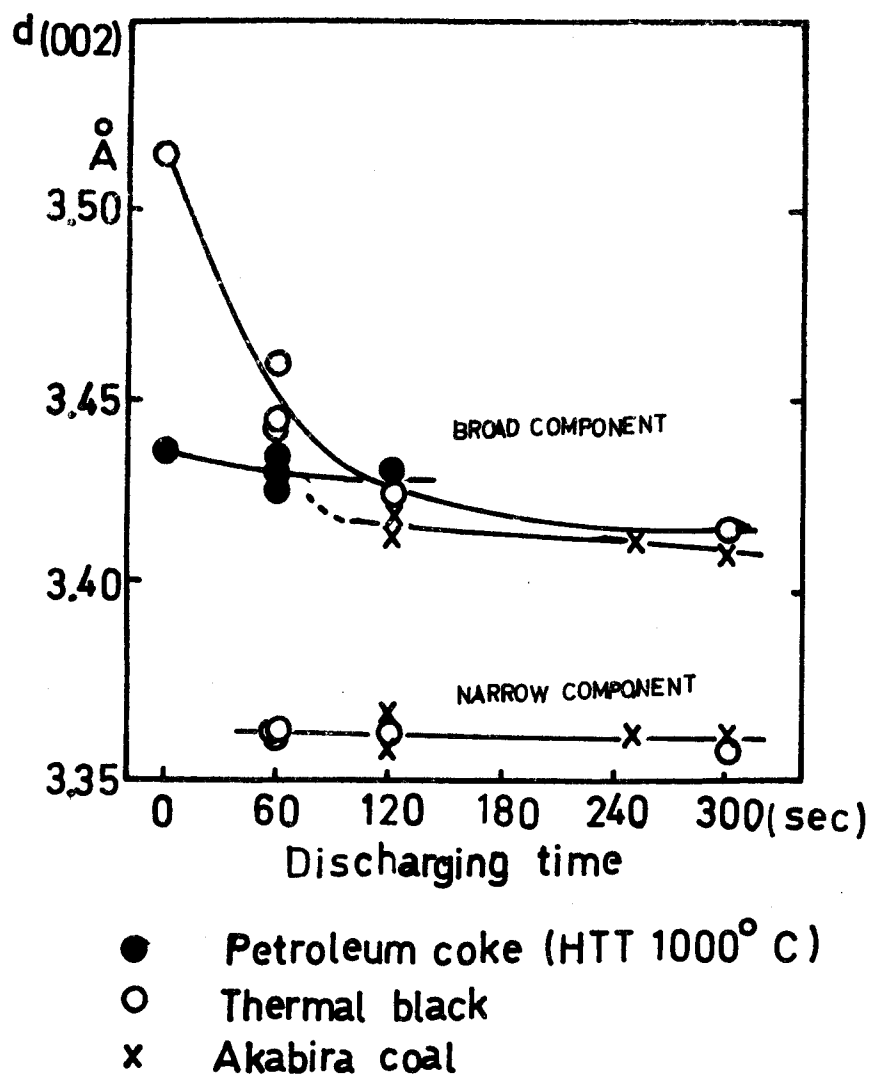


Fig. The change of  $d(002)$  spacing of the sintered and graphitized carbon as a function of discharging time.